

Chapter NR 666

STANDARDS FOR MANAGING SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subchapter C —Recyclable Materials Used in a Manner Constituting Disposal

NR 666.020	Applicability.
NR 666.021	Standards applicable to generators and transporters of materials used in a manner that constitutes disposal.
NR 666.022	Standards applicable to storers of materials that are to be used in a manner that constitutes disposal who are not the ultimate users.
NR 666.023	Standards applicable to users of materials that are used in a manner that constitutes disposal.

Subchapter C —Recyclable Materials Used in a Manner Constituting Disposal

NR 666.020 Applicability. (1) This subchapter applies to recyclable materials that are applied to or placed on the land in one of the following ways:

(a) Without mixing with any other substance.

(b) After mixing or combination with any other substance or substances. These materials will be referred to throughout this subchapter as "materials used in a manner that constitutes disposal".

(2) Products produced for the general public's use that are used in a manner that constitutes disposal and that contain recyclable materials are not presently regulated if the recyclable materials have undergone a chemical reaction in the course of producing the products so as to become inseparable by physical means and if the products meet the applicable treatment standards in subch. D of ch. NR 668 (or applicable prohibition levels in s. NR 668.32, where no treatment standards have been established) for each recyclable material (i.e., hazardous waste) that they contain.

(3) Anti-skid and deicing uses of slags, which are generated from high temperature metals recovery (HTMR) processing of hazardous waste K061, K062 and F006, in a manner constituting disposal are not covered by the exemption in sub. (2) and remain regulated.

(4) Fertilizers that contain recyclable materials are not regulated if any of the following apply:

(a) They are zinc fertilizers excluded from the definition of solid waste according to s. NR 661.04(1)(u).

(b) They meet the applicable treatment standards in subch. D of ch. NR 668 for each hazardous waste that they contain.

Note: This subchapter is based on federal regulations contained in 40 CFR part 266 subpart C, as last revised on July 24, 2002 and effective as late as January 24, 2003.

NR 666.021 Standards applicable to generators and transporters of materials used in a manner that constitutes disposal. Generators and transporters of materials that are used in a manner that constitutes disposal are subject to the applicable requirements of chs. NR 662 and 663, and the notification requirement under s. NR 660.07.

NR 666.022 Standards applicable to storers of materials that are to be used in a manner that constitutes disposal who are not the ultimate users. Owners or operators of facilities that store

recyclable materials that are to be used in a manner that constitutes disposal, but who are not the ultimate users of the materials, are regulated under all applicable provisions of subchs. A to L of chs. NR 664 and 665, ch. NR 670 and the notification requirement under s. NR 660.07.

NR 666.023 Standards applicable to users of materials that are used in a manner that constitutes disposal. (1) Owners or operators of facilities that use recyclable materials in a manner that constitutes disposal are regulated under all applicable provisions of subchs. A to N of chs. NR 664 and 665, and chs. NR 668 and 670 and the notification requirement under s. NR 660.07. (These requirements do not apply to products which contain these recyclable materials under the provisions of s. NR 666.020(2).)

(2) The use of waste or used oil or other material, which is contaminated with dioxin or any other hazardous waste (other than a waste identified solely on the basis of ignitability), for dust suppression or road treatment is prohibited.

Chapter NR 666

STANDARDS FOR MANAGING SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subchapter F —Recyclable Materials Used for Precious Metal Recovery

NR 666.070 Applicability and requirements.

Subchapter F —Recyclable Materials Used for Precious Metal Recovery

NR 666.070 Applicability and requirements. (1) This subchapter applies to recyclable materials that are reclaimed to recover economically significant amounts of gold, silver, platinum, palladium, iridium, osmium, rhodium, ruthenium or any combination of these.

(2) Persons who generate, transport or store recyclable materials that are regulated under this subchapter are subject to all of the following requirements:

(a) Notification requirements under s. NR 660.07.

(b) Subchapter B of ch. NR 662 for generators, ss. NR 663.20 and 663.21 for transporters and ss. NR 665.0071 and 665.0072 for persons who store.

(c) For precious metals exported to or imported from designated OECD member countries for recovery, persons who generate, transport or store recyclable materials are subject to subch. H of ch. NR 662 and s. NR 665.0012(1)(b). For precious metals exported to or imported from non-OECD countries for recovery, persons who generate, transport or store recyclable materials are subject to subchs. E and F of ch. NR 662.

(3) Persons who store recycled materials that are regulated under this subchapter shall keep all of the following records to document that they are not accumulating these materials speculatively (as defined in s. NR 661.01(3)):

(a) Records showing the volume of these materials stored at the beginning of the calendar year.

(b) The amount of these materials generated or received during the calendar year.

(c) The amount of materials remaining at the end of the calendar year.

(4) Recyclable materials that are regulated under this subchapter that are accumulated speculatively (as defined in s. NR 661.01(3)) are subject to all applicable provisions of chs. NR 662 to 665 and 670.

Note: This subchapter is based on federal regulations contained in 40 CFR part 266 subpart F, revised as of July 1, 2002.

Chapter NR 666

STANDARDS FOR MANAGING SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subchapter G —Spent Lead-Acid Batteries Being Reclaimed

NR 666.080 Applicability and requirements.

Subchapter G —Spent Lead-Acid Batteries Being Reclaimed

NR 666.080 Applicability and requirements. (1) Are spent lead-acid batteries exempt from hazardous waste management requirements? If you generate, collect, transport, store or regenerate lead-acid batteries for reclamation purposes, you may be exempt from certain hazardous waste management requirements. Use the following table to determine which requirements apply to you. Alternatively, you may choose to manage your spent lead-acid batteries under the "Universal Waste" rule in ch. NR 673.

Note: In addition to the requirements of this subchapter or ch. NR 673, s. 287.18, Stats., applies to persons who sell lead acid batteries.

Chapter NR 666

STANDARDS FOR MANAGING SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subchapter H —Hazardous Waste Burned in Boilers and Industrial Furnaces

NR 666.100	Applicability.
NR 666.101	Management prior to burning.
NR 666.102	License standards for burners.
NR 666.103	Interim license standards for burners.
NR 666.104	Standards to control organic emissions.
NR 666.105	Standards to control particulate matter.
NR 666.106	Standards to control metals emissions.
NR 666.107	Standards to control hydrogen chloride (HCl) and chlorine gas (Cl ₂) emissions.
NR 666.108	Small quantity on-site burner exemption.
NR 666.109	Low risk waste exemption.
NR 666.110	Waiver of DRE trial burn for boilers.

WA-10-05

NR 666.111 Standards for direct transfer.
NR 666.112 Regulation of residues.

APPENDIX I—TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR METALS

APPENDIX II—TIER I FEED RATE SCREENING LIMITS FOR TOTAL CHLORINE

APPENDIX III—TIER II EMISSION RATE SCREENING LIMITS FOR FREE CHLORINE AND HYDROGEN
CHLORIDE

APPENDIX IV—REFERENCE AIR CONCENTRATIONS

APPENDIX V—RISK SPECIFIC DOSES (10^{-5})

APPENDIX VI—STACK PLUME RISE

APPENDIX VII—HEALTH-BASED LIMITS FOR EXCLUSION OF WASTE-DERIVED RESIDUES

APPENDIX VIII—ORGANIC COMPOUNDS FOR WHICH RESIDUES SHALL BE ANALYZED

APPENDIX IX—METHODS MANUAL FOR COMPLIANCE WITH THE BIF REGULATIONS

APPENDIX XI—LEAD-BEARING MATERIALS THAT MAY BE PROCESSED IN EXEMPT LEAD SMELTERS

APPENDIX XII—NICKEL OR CHROMIUM-BEARING MATERIALS THAT MAY BE PROCESSED IN EXEMPT
NICKEL-CHROMIUM RECOVERY FURNACES

APPENDIX XIII—MERCURY BEARING WASTES THAT MAY BE PROCESSED IN EXEMPT MERCURY RECOVERY
UNITS

Subchapter H —Hazardous Waste Burned in Boilers and Industrial Furnaces

NR 666.100 Applicability. (1) The regulations of this subchapter apply to hazardous waste burned or processed in a boiler or industrial furnace (as defined in s. NR 660.10) irrespective of the purpose of burning or processing, except as provided by subs. (2), (3), (4), (7) and (8). In this subchapter, the term "burn" means burning for energy recovery or destruction, or processing for materials recovery or as an ingredient. The emissions standards of ss. NR 666.104, 666.105, 666.106 and 666.107 apply to facilities operating under an interim license or under a license as specified in ss. NR 666.102 and 666.103.

(2) (a) Except as provided by par. (b), the standards of this chapter no longer apply when an affected source demonstrates compliance with the maximum achievable control technology (MACT) requirements of 40 CFR part 63, subpart EEE, by conducting a comprehensive performance test and submitting to the department a notification of compliance under 40 CFR 63.1207(j) and 63.1210(b) documenting compliance with 40 CFR part 63, subpart EEE. Nevertheless, even after this demonstration of compliance with the MACT standards, hazardous waste license conditions that were based on the standards of this chapter shall continue to be in effect until they are removed from the license or the license is terminated or revoked, unless the license expressly provides otherwise.

(b) The following standards all continue to apply:

1. If you elect to comply with s. NR 670.235(1)(a)1. to minimize emissions of toxic compounds from startup, shutdown and malfunction events, s. NR 666.102(5)(a) requiring operations in accordance with the operating requirements specified in the license at all times that hazardous waste is in the unit, and s. NR 666.102(5)(b)3. requiring compliance with the emission standards and operating requirements during startup and shutdown if hazardous waste is in the combustion chamber, except for particular hazardous wastes. These provisions apply only during startup, shutdown and malfunction events.
2. The closure requirements of ss. NR 666.102(5)(k) and 666.103(12).
3. The standards for direct transfer of s. NR 666.111.
4. The standards for regulation of residues of s. NR 666.212.

5. The applicable requirements of subchs. A to H, BB and CC of chs. NR 664 and 665.

(3) The following hazardous wastes and facilities are not subject to regulation under this subchapter:

(a) Used oil burned for energy recovery that is also a hazardous waste solely because it exhibits a characteristic of hazardous waste identified in subch. C of ch. NR 661. Such used oil is subject to regulation under ch. NR 679.

(b) Gas recovered from hazardous or solid waste landfills when such gas is burned for energy recovery.

(c) Hazardous wastes that are exempt from regulation under ss. NR 661.04 and 661.06(1)(c)3. and 4., and hazardous wastes that are subject to the special requirements for conditionally exempt small quantity generators under s. NR 661.05.

(d) Coke ovens, if the only hazardous waste burned is EPA hazardous waste number K087, decanter tank tar sludge from coking operations.

(4) Owners and operators of smelting, melting and refining furnaces (including pyrometallurgical devices such as cupolas, sintering machines, roasters and foundry furnaces, but not including cement kilns, aggregate kilns or halogen acid furnaces burning hazardous waste) that process hazardous waste solely for metal recovery are conditionally exempt from regulation under this subchapter, except for ss. NR 666.101 and 666.112.

(a) To be exempt from ss. NR 666.102 to 666.111, an owner or operator of a metal recovery furnace or mercury recovery furnace shall comply with all of the following requirements, except that an owner or operator of a lead or a nickel-chromium recovery furnace, or a metal recovery furnace that burns baghouse bags used to capture metallic dusts emitted by steel manufacturing, shall comply with par. (c), and owners or operators of lead recovery furnaces that are subject to regulation under the Secondary Lead Smelting national emission standards for hazardous air pollutants (NESHAP) shall comply with sub. (8).

1. Provide a one-time written notice to the department indicating all of the following:

a. The owner or operator claims exemption under this subsection.

b. The hazardous waste is burned solely for metal recovery consistent with par. (b).

c. The hazardous waste contains recoverable levels of metals.

d. The owner or operator will comply with the sampling and analysis and recordkeeping requirements of this subsection.

2. Sample and analyze the hazardous waste and other feedstocks as necessary to comply with this subsection under procedures specified by Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in s. NR 660.11, or alternative methods that meet or exceed the SW-846 method performance capabilities. If SW-846 does not prescribe a method for a particular determination, the owner or operator shall use the best available method.

3. Maintain at the facility for at least 3 years records to document compliance with this subsection including limits on levels of toxic organic constituents and Btu value of the waste, and levels of recoverable metals in the hazardous waste compared to normal nonhazardous waste feedstocks.

(b) A hazardous waste meeting either of the following criteria is not processed solely for metal recovery:

1. The hazardous waste has a total concentration of organic compounds listed in ch. NR 661, Appendix VIII, exceeding 500 ppm by weight, as-fired, and so is considered to be burned for destruction. The concentration of organic compounds in a waste as-generated may be reduced to the 500 ppm limit by bona fide treatment that removes or destroys organic constituents. Blending for dilution to meet the 500 ppm limit is prohibited and documentation that the waste has not been impermissibly diluted shall be retained in the records required by par.(a)3.

2. The hazardous waste has a heating value of 5,000 Btu/lb or more, as-fired, and so is considered to be burned as fuel. The heating value of a waste as-generated may be reduced to below the 5,000 Btu/lb limit by bona fide treatment that removes or destroys organic constituents. Blending for dilution to meet

the 5,000 Btu/lb limit is prohibited and documentation that the waste has not been impermissibly diluted shall be retained in the records required by par. (a)3.

(c) To be exempt from ss. NR 666.102 to 666.111, an owner or operator of a lead or nickel-chromium or mercury recovery furnace (except for owners or operators of lead recovery furnaces subject to regulation under the Secondary Lead Smelting national emission standards for hazardous air pollutants (NESHAP)) or a metal recovery furnace that burns baghouse bags used to capture metallic dusts emitted by steel manufacturing, shall provide a one-time written notice to the department identifying each hazardous waste burned and specifying whether the owner or operator claims an exemption for each waste under this paragraph or par. (a). The owner or operator shall comply with par. (a) for those wastes claimed to be exempt under par. (a) and shall comply with the requirements below for those wastes claimed to be exempt under this paragraph.

1. The hazardous wastes listed in Appendices XI, XII and XIII, and baghouse bags used to capture metallic dusts emitted by steel manufacturing, are exempt from par. (a), if all of the following conditions are met:

a. A waste listed in Appendix IX shall contain recoverable levels of lead, a waste listed in Appendix XII shall contain recoverable levels of nickel or chromium, a waste listed in Appendix XIII shall contain recoverable levels of mercury and contain less than 500 ppm of ch. NR 661, Appendix VIII organic constituents, and baghouse bags used to capture metallic dusts emitted by steel manufacturing shall contain recoverable levels of metal.

b. The waste does not exhibit the toxicity characteristic of s. NR 661.24 for an organic constituent.

c. The waste is not a hazardous waste listed in subch. D of ch. NR 661 because it is listed for an organic constituent as identified in ch. NR 661, Appendix VII.

d. The owner or operator certifies in the one-time notice that hazardous waste is burned under this paragraph and that sampling and analysis will be conducted or other information will be obtained as necessary to ensure continued compliance with these requirements. Sampling and analysis shall be conducted according to par. (a)2. and records to document compliance with this paragraph shall be kept for at least 3 years.

2. The department may decide on a case-by-case basis that the toxic organic constituents in a material listed in Appendix XI, XII or XIII that contains a total concentration of more than 500 ppm toxic organic compounds listed in ch. NR 661, Appendix VIII may pose a hazard to human health and the environment when burned in a metal recovery furnace exempt from this subchapter. In that situation, after adequate notice and opportunity for comment, the metal recovery furnace shall become subject to this subchapter when burning that material. In making the hazard determination, the department will consider all of the following factors:

a. The concentration and toxicity of organic constituents in the material.

b. The level of destruction of toxic organic constituents provided by the furnace.

c. Whether the acceptable ambient levels established in Appendices IV or V may be exceeded for any toxic organic compound that may be emitted based on dispersion modeling to predict the maximum annual average off-site ground level concentration.

(5) The standards for direct transfer operations under s. NR 666.111 apply only to facilities subject to the license standards of s. NR 666.102 or the interim license standards of s. NR 666.103.

(6) The management standards for residues under s. NR 666.112 apply to any boiler or industrial furnace burning hazardous waste.

(7) Owners and operators of smelting, melting and refining furnaces (including pyrometallurgical devices such as cupolas, sintering machines, roasters and foundry furnaces) that process hazardous waste for recovery of economically significant amounts of the precious metals gold, silver, platinum, palladium, iridium, osmium, rhodium or ruthenium, or any combination of these are conditionally exempt from

regulation under this subchapter, except for s. NR 666.112. To be exempt from ss. NR 666.101 to 666.111, an owner or operator shall do all of the following:

(a) Provide a one-time written notice to the department indicating all of the following:

1. The owner or operator claims exemption under this subsection.
2. The hazardous waste is burned for legitimate recovery of precious metal.
3. The owner or operator will comply with the sampling and analysis and recordkeeping

requirements of this subsection.

(b) Sample and analyze the hazardous waste as necessary to document that the waste is burned for recovery of economically significant amounts of precious metal using procedures specified by Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in s. NR 660.11 or alternative methods that meet or exceed the SW-846 method performance capabilities. If SW-846 does not prescribe a method for a particular determination, the owner or operator shall use the best available method.

(c) Maintain at the facility for at least 3 years records to document that all hazardous wastes burned are burned for recovery of economically significant amounts of precious metal.

(8) Starting June 23, 1997, owners or operators of lead recovery furnaces that process hazardous waste for recovery of lead and that are subject to regulation under the Secondary Lead Smelting national standards for hazardous air pollutants (NESHAP), are conditionally exempt from regulation under this subchapter, except for s. NR 666.101. To be exempt, an owner or operator shall provide a one-time notice to the department identifying each hazardous waste burned and specifying that the owner or operator claims an exemption under this subsection. The notice also shall state that the waste burned has a total concentration of non-metal compounds listed in ch. NR 661, Appendix VIII, of less than 500 ppm by weight, as fired and as provided in sub. (4)(b)1., or is listed in Appendix XI.

Note: This subchapter is based on federal regulations contained in 40 CFR part 266 subpart H, revised as of July 1, 2003.

NR 666.101 Management prior to burning. (1) **GENERATORS.** Generators of hazardous waste that is burned in a boiler or industrial furnace are subject to ch. NR 662 .

(2) **TRANSPORTERS.** Transporters of hazardous waste that is burned in a boiler or industrial furnace are subject to ch. NR 663 .

(3) **STORAGE AND TREATMENT FACILITIES.** (a) Owners and operators of facilities that store or treat hazardous waste that is burned in a boiler or industrial furnace are subject to the applicable provisions of chs. NR 664, 665 and 670, except as provided by sub. (3)(b). These standards apply to storage and treatment by the burner as well as to storage and treatment facilities operated by intermediaries (processors, blenders, distributors, etc.) between the generator and the burner.

(b) Owners and operators of facilities that burn, in an onsite boiler or industrial furnace exempt from regulation under the small quantity burner provisions of s. NR 666.108, hazardous waste that they generate are exempt from the regulations of chs. NR 664, 665 and 670 applicable to storage units for those storage units that store mixtures of hazardous waste and the primary fuel to the boiler or industrial furnace in tanks that feed the fuel mixture directly to the burner. Storage of hazardous waste prior to mixing with the primary fuel is subject to regulation as prescribed in par. (a).

NR 666.102 License standards for burners. (1) **APPLICABILITY** (a) *General.* Owners and operators of boilers and industrial furnaces burning hazardous waste and not operating under an interim license shall comply with this section and ss. NR 670.022 and 670.066, unless exempt under the small quantity burner exemption of s. NR 666.108.

(b) *Applicability of ch. NR 664 standards.* Owners and operators of boilers and industrial furnaces that burn hazardous waste are subject to the following provisions of ch. NR 664, except as provided otherwise by this subchapter:

1. In subch. A of ch. NR 664 (General), s. NR 664.0004.
2. In subch. B of ch. NR 664 (General facility standards), s. NR 664.0011 to 664.0018.
3. In subch. C of ch. NR 664 (Preparedness and prevention), ss. NR 664.0031 to 664.0037.
4. In subch. D of ch. NR 664 (Contingency plan and emergency procedures), ss. NR 664.0051 to 664.0056.
5. In subch. E of ch. NR 664 (Manifest system, recordkeeping and reporting), the applicable provisions of ss. NR 664.0071 to 664.0077.
6. In subch. F of ch. NR 664 (Corrective Action), ss. NR 664.0090 and 664.0101.
7. In subch. G of ch. NR 664 (Closure and post-closure), ss. NR 664.0111 to 664.0115.
8. In subch. H of ch. NR 664 (Financial requirements), ss. NR 664.0141, 664.0142, 664.0143 and 664.0147 to 664.0151, except that states and the federal government are exempt from s. NR 664.0147.
9. Subchapter BB (Air emission standards for equipment leaks), except s. NR 664.1050(1).

(2) HAZARDOUS WASTE ANALYSIS. (a) The owner or operator shall provide an analysis of the hazardous waste that quantifies the concentration of any constituent identified in ch. NR 661, Appendix VIII that may reasonably be expected to be in the waste. Such constituents shall be identified and quantified if present, at levels detectable by analytical procedures prescribed by Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in s. NR 660.11. Alternative methods that meet or exceed the method performance capabilities of SW-846 methods may be used. If SW-846 does not prescribe a method for a particular determination, the owner or operator shall use the best available method. The ch. NR 661, Appendix VIII constituents excluded from this analysis shall be identified and the basis for their exclusion explained. This analysis shall be used to provide all information required by this subchapter and ss. NR 670.022 and 670.066 and to enable the license writer to prescribe such license conditions as necessary to protect human health and the environment. Such analysis shall be included as a portion of the feasibility and plan of operation report, or, for facilities operating under the interim license standards of this subchapter, as a portion of the trial burn plan that may be submitted before the feasibility and plan of operation report under provisions of s. NR 670.066(7) as well as any other analysis required by the license authority in preparing the license. Owners and operators of boilers and industrial furnaces not operating under the interim license standards shall provide the information required by s. NR 670.022 or 670.066(3) in the feasibility and plan of operation report to the greatest extent possible.

(b) Throughout normal operation, the owner or operator shall conduct sampling and analysis as necessary to ensure that the hazardous waste, other fuels, and industrial furnace feedstocks fired into the boiler or industrial furnace are within the physical and chemical composition limits specified in the license.

(3) EMISSIONS STANDARDS. Owners and operators shall comply with emissions standards provided by ss. NR 666.104 to 666.107.

(4) LICENSES. (a) The owner or operator may burn only hazardous wastes specified in the facility license and only under the operating conditions specified under sub. (5), except in approved trial burns under the conditions specified in s. NR 670.066.

(b) Hazardous wastes not specified in the license may not be burned until operating conditions have been specified under a new license or license modification, as applicable. Operating requirements for new wastes may be based on either trial burn results or alternative data included with feasibility and plan of operation report under s. NR 670.022.

(c) Boilers and industrial furnaces operating under the interim license standards of s. NR 666.103 are permitted under procedures provided by s. NR 670.066(7).

(d) A license for a new boiler or industrial furnace (those boilers and industrial furnaces not operating under the interim license standards) shall establish appropriate conditions for each of the applicable requirements of this section, including but not limited to allowable hazardous waste firing rates and operating conditions necessary to meet sub. (5), in order to comply with all of the following standards:

1. For the period beginning with initial introduction of hazardous waste and ending with initiation of the trial burn, and only for the minimum time required to bring the device to a point of operational readiness to conduct a trial burn, not to exceed a duration of 720 hours operating time when burning hazardous waste, the operating requirements shall be those most likely to ensure compliance with the emission standards of ss. NR 666.104 to 666.107, based on the department's engineering judgment. If the applicant is seeking a waiver from a trial burn to demonstrate conformance with a particular emission standard, the operating requirements during this initial period of operation shall include those specified by the applicable provisions of s. NR 666.104, 666.105, 666.106 or 666.107. The department may extend the duration of this period for up to 720 additional hours when good cause for the extension is demonstrated by the applicant.

2. For the duration of the trial burn, the operating requirements shall be sufficient to demonstrate compliance with the emissions standards of ss. NR 666.104 to 666.107 and shall be in accordance with the approved trial burn plan.

3. For the period immediately following completion of the trial burn, and only for the minimum period sufficient to allow sample analysis, data computation, submission of the trial burn results by the applicant, review of the trial burn results and modification of the facility license by the department to reflect the trial burn results, the operating requirements shall be those most likely to ensure compliance with the emission standards of ss. NR 666.104 to 666.107 based on the department's engineering judgment.

4. For the remaining duration of the license, the operating requirements shall be those demonstrated in a trial burn or by alternative data specified in s. NR 670.022, as sufficient to ensure compliance with the emissions standards of ss. NR 666.104 to 666.107.

(5) OPERATING REQUIREMENTS (a) *General.* A boiler or industrial furnace burning hazardous waste shall be operated in accordance with the operating requirements specified in the license at all times where there is hazardous waste in the unit.

(b) *Requirements to ensure compliance with the organic emissions standards* 1. 'DRE standard.' Operating conditions shall be specified either on a case-by-case basis for each hazardous waste burned as those demonstrated (in a trial burn or by alternative data as specified in s. NR 670.022) to be sufficient to comply with the destruction and removal efficiency (DRE) performance standard of s. NR 666.104(1) or as those special operating requirements provided by s. NR 666.104(1)(d) for the waiver of the DRE trial burn. When the DRE trial burn is not waived under s. NR 666.104(1)(d), each set of operating requirements shall specify the composition of the hazardous waste (including acceptable variations in the physical and chemical properties of the hazardous waste which will not affect compliance with the DRE performance standard) to which the operating requirements apply. For each such hazardous waste, the license shall specify acceptable operating limits including, but not limited to, the following conditions as appropriate:

- a. Feed rate of hazardous waste and other fuels measured and specified as prescribed in par. (f).
- b. Minimum and maximum device production rate when producing normal product expressed in appropriate units, measured and specified as prescribed in par. (f).
- c. Appropriate controls of the hazardous waste firing system.
- d. Allowable variation in boiler and industrial furnace system design or operating procedures.
- e. Minimum combustion gas temperature measured at a location indicative of combustion chamber temperature, measured and specified as prescribed in par. (f).

f. An appropriate indicator of combustion gas velocity, measured and specified as prescribed in par. (f), unless documentation is provided under s. NR 670.066 demonstrating adequate combustion gas residence time.

g. Such other operating requirements as are necessary to ensure that the DRE performance standard of s. NR 666.104(1) is met.

2. 'Carbon monoxide and hydrocarbon standards.' The license shall incorporate a carbon monoxide (CO) limit and, as appropriate, a hydrocarbon (HC) limit as provided by s. NR 666.104(2), (3), (4), (5) and (6). The license limits shall be specified as follows:

a. When complying with the CO standard of s. NR 666.104(2)(a), the license limit is 100 ppmv.

b. When complying with the alternative CO standard under s. NR 666.104(3), the license limit for CO is based on the trial burn and is established as the average over all valid runs of the highest hourly rolling average CO level of each run, and the license limit for HC is 20 ppmv (as defined in s. NR 666.104(3)(a)), except as provided in s. NR 666.104(6).

c. When complying with the alternative HC limit for industrial furnaces under s. NR 666.104(6), the license limit for HC and CO is the baseline level when hazardous waste is not burned as specified by that subsection.

3. 'Startup and shutdown.' During startup and shutdown of the boiler or industrial furnace, hazardous waste (except waste fed solely as an ingredient under the Tier I (or adjusted Tier I) feed rate screening limits for metals and chloride or chlorine, and except low risk waste exempt from the trial burn requirements under ss. NR 666.104(1)(e), 666.105, 666.106 and 666.107) may not be fed into the device unless the device is operating within the conditions of operation specified in the license.

(c) *Requirements to ensure conformance with the particulate standard.* 1. Except as provided in subds. 2. and 3., the license shall specify the following operating requirements to ensure conformance with the particulate standard specified in s. NR 666.105:

a. Total ash feed rate to the device from hazardous waste, other fuels and industrial furnace feedstocks, measured and specified as prescribed in par. (f).

b. Maximum device production rate when producing normal product expressed in appropriate units, and measured and specified as prescribed in par. (f).

c. Appropriate controls on operation and maintenance of the hazardous waste firing system and any air pollution control system.

d. Allowable variation in boiler and industrial furnace system design including any air pollution control system or operating procedures.

e. Such other operating requirements as are necessary to ensure that the particulate standard in s. NR 666.111(2) is met.

2. License conditions to ensure conformance with the particulate matter standard may not be provided for facilities exempt from the particulate matter standard under s. NR 666.105(2).

3. For cement kilns and light-weight aggregate kilns, license conditions to ensure compliance with the particulate standard may not limit the ash content of hazardous waste or other feed materials.

(d) *Requirements to ensure conformance with the metals emissions standard.* 1. For conformance with the Tier I (or adjusted Tier I) metals feed rate screening limits of s. NR 666.106(2) or (5), the license shall specify the following operating requirements:

a. Total feed rate of each metal in hazardous waste, other fuels, and industrial furnace feedstocks measured and specified under provisions of par. (f).

b. Total feed rate of hazardous waste measured and specified as prescribed in par. (f).

c. A sampling and metals analysis program for the hazardous waste, other fuels and industrial furnace feedstocks.

2. For conformance with the Tier II metals emission rate screening limits under s. NR 666.106(3) and the Tier III metals controls under s. NR 666.106(4), the license shall specify the following operating requirements:

- a. Maximum emission rate for each metal specified as the average emission rate during the trial burn.
- b. Feed rate of total hazardous waste and pumpable hazardous waste, each measured and specified as prescribed in par. (f)1.
- c. Feed rate of each metal in the following feedstreams, measured and specified as prescribed in par. (f):
 - 1) Total feedstreams.
 - 2) Total hazardous waste feed.
 - 3) Total pumpable hazardous waste feed.
- d. Total feed rate of chlorine and chloride in total feedstreams measured and specified as prescribed in par. (f).
- e. Maximum combustion gas temperature measured at a location indicative of combustion chamber temperature, and measured and specified as prescribed in par. (f).
- f. Maximum flue gas temperature at the inlet to the particulate matter air pollution control system measured and specified as prescribed in par. (f).
- g. Maximum device production rate when producing normal product expressed in appropriate units and measured and specified as prescribed in par. (f).
- h. Appropriate controls on operation and maintenance of the hazardous waste firing system and any air pollution control system.
- i. Allowable variation in boiler and industrial furnace system design including any air pollution control system or operating procedures.
- j. Such other operating requirements as are necessary to ensure that the metals standards under s. NR 666.106(3) or (4) are met.

3. For conformance with an alternative implementation approach approved by the department under s. NR 666.106(6), the license shall specify all of the following operating requirements:

- a. Maximum emission rate for each metal specified as the average emission rate during the trial burn.
- b. Feed rate of total hazardous waste and pumpable hazardous waste, each measured and specified as prescribed in par. (f)1.
- c. Feed rate of each metal in the following feedstreams, measured and specified as prescribed in par. (f):
 - 1) Total hazardous waste feed.
 - 2) Total pumpable hazardous waste feed.
- d. Total feed rate of chlorine and chloride in total feedstreams measured and specified prescribed in par. (f).
- e. Maximum combustion gas temperature measured at a location indicative of combustion chamber temperature, and measured and specified as prescribed in par. (f).
- f. Maximum flue gas temperature at the inlet to the particulate matter air pollution control system measured and specified as prescribed in par. (f).
- g. Maximum device production rate when producing normal product expressed in appropriate units and measured and specified as prescribed in par. (f).
- h. Appropriate controls on operation and maintenance of the hazardous waste firing system and any air pollution control system.
- i. Allowable variation in boiler and industrial furnace system design including any air pollution control system or operating procedures.
- j. Such other operating requirements as are necessary to ensure that the metals standards under s. NR 666.106(3) or (4) are met.

(e) *Requirements to ensure conformance with the hydrogen chloride and chlorine gas standards.* 1. For conformance with the Tier I total chloride and chlorine feed rate screening limits of s. NR 666.107(2)(a), the license shall specify all of the following operating requirements:

- a. Feed rate of total chloride and chlorine in hazardous waste, other fuels, and industrial furnace feedstocks measured and specified as prescribed in par. (f).
- b. Feed rate of total hazardous waste measured and specified as prescribed in par. (f).
- c. A sampling and analysis program for total chloride and chlorine for the hazardous waste, other fuels and industrial furnace feedstocks.

2. For conformance with the Tier II HCl and Cl₂ emission rate screening limits under s. NR 666.107(2)(b) and the Tier III HCl and Cl₂ controls under s. NR 666.107(3), the license shall specify the following operating requirements:

- a. Maximum emission rate for HCl and for Cl₂ specified as the average emission rate during the trial burn.
- b. Feed rate of total hazardous waste measured and specified as prescribed in par. (f).
- c. Total feed rate of chlorine and chloride in total feedstreams, measured and specified as prescribed in par. (f).
- d. Maximum device production rate when producing normal product expressed in appropriate units, measured and specified as prescribed in par. (f).
- e. Appropriate controls on operation and maintenance of the hazardous waste firing system and any air pollution control system.
- f. Allowable variation in boiler and industrial furnace system design including any air pollution control system or operating procedures.
- g. Such other operating requirements as are necessary to ensure that the HCl and Cl₂ standards under s. NR 666.107(2)(b) or (3) are met.

(f) *Measuring parameters and establishing limits based on trial burn data* 1. 'General requirements.' As specified in pars. (b) to (e), each operating parameter shall be measured, and license limits on the parameter shall be established, according to either of the following procedures:

- a. A parameter may be measured and recorded on an instantaneous basis (i.e., the value that occurs at any time) and the license limit specified as the time-weighted average during all valid runs of the trial burn.

b.1) The limit for a parameter may be established and continuously monitored on an hourly rolling average basis defined as follows:

- a) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

b) An hourly rolling average is the arithmetic mean of the 60 most recent 1-minute average values recorded by the continuous monitoring system.

2) The license limit for the parameter shall be established based on trial burn data as the average over all valid test runs of the highest hourly rolling average value for each run.

2. 'Rolling average limits for carcinogenic metals and lead.' Feed rate limits for the carcinogenic metals (i.e., arsenic, beryllium, cadmium and chromium) and lead may be established either on an hourly rolling average basis as prescribed by subd. 1. or on (up to) a 24 hour rolling average basis. If the owner or operator elects to use an average period from 2 to 24 hours:

- a. The feed rate of each metal shall be limited at any time to 10 times the feed rate that would be allowed on an hourly rolling average basis.
- b. The continuous monitor shall meet all of the following specifications:

1) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

2) The rolling average for the selected averaging period is defined as the arithmetic mean of one hour block averages for the averaging period. A one hour block average is the arithmetic mean of the one minute averages recorded during the 60-minute period beginning at one minute after the beginning of preceding clock hour.

c. The license limit for the feed rate of each metal shall be established based on trial burn data as the average over all valid test runs of the highest hourly rolling average feed rate for each run.

3. 'Feed rate limits for metals, total chloride and chlorine, and ash.' Feed rate limits for metals, total chlorine and chloride, and ash are established and monitored by knowing the concentration of the substance (i.e., metals, chloride and chlorine, and ash) in each feedstream and the flow rate of the feedstream. To monitor the feed rate of these substances, the flow rate of each feedstream shall be monitored under the continuous monitoring requirements of subds. 1. and 2.

4. 'Conduct of trial burn testing.' a. If compliance with all applicable emissions standards of ss. NR 666.104 to 666.107 is not demonstrated simultaneously during a set of test runs, the operating conditions of additional test runs required to demonstrate compliance with remaining emissions standards shall be as close as possible to the original operating conditions.

b. Prior to obtaining test data for purposes of demonstrating compliance with the emissions standards of ss. NR 666.104 to 666.107 or establishing limits on operating parameters under this section, the facility shall operate under trial burn conditions for a sufficient period to reach steady-state operations. The department may determine, however, that industrial furnaces that recycle collected particulate matter back into the furnace and that comply with an alternative implementation approach for metals under s. NR 666.106(6) need not reach steady state conditions with respect to the flow of metals in the system prior to beginning compliance testing for metals emissions.

c. Trial burn data on the level of an operating parameter for which a limit shall be established in the license shall be obtained during emissions sampling for the pollutant or pollutants (i.e., metals, PM, HCl/Cl₂, organic compounds) for which the parameter shall be established as specified by this subsection.

(g) *General requirements* 1. 'Fugitive emissions.' Fugitive emissions shall be controlled by one of the following:

a. Keeping the combustion zone totally sealed against fugitive emissions.
b. Maintaining the combustion zone pressure lower than atmospheric pressure.
c. An alternate means of control demonstrated (with the feasibility and plan of operation report) to provide fugitive emissions control equivalent to maintenance of combustion zone pressure lower than atmospheric pressure.

2. 'Automatic waste feed cutoff.' A boiler or industrial furnace shall be operated with a functioning system that automatically cuts off the hazardous waste feed when operating conditions deviate from those established under this section. The department may limit the number of cutoffs per an operating period on a case-by-case basis. In addition, all of the following conditions shall be met:

a. The license limit for (the indicator of) minimum combustion chamber temperature shall be maintained while hazardous waste or hazardous waste residues remain in the combustion chamber.

b. Exhaust gases shall be ducted to the air pollution control system operated in accordance with the license requirements while hazardous waste or hazardous waste residues remain in the combustion chamber.

c. Operating parameters for which license limits are established shall continue to be monitored during the cutoff, and the hazardous waste feed may not be restarted until the levels of those parameters comply with the license limits. For parameters that may be monitored on an instantaneous basis, the

department shall establish a minimum period of time after a waste feed cutoff during which the parameter may not exceed the license limit before the hazardous waste feed may be restarted.

3. 'Changes.' A boiler or industrial furnace shall cease burning hazardous waste when changes in combustion properties, or feed rates of the hazardous waste, other fuels or industrial furnace feedstocks, or changes in the boiler or industrial furnace design or operating conditions deviate from the limits as specified in the license.

(h) *Monitoring and Inspections.* 1. The owner or operator shall monitor and record all of the following, at a minimum, while burning hazardous waste:

a. If specified by the license, feed rates and composition of hazardous waste, other fuels and industrial furnace feedstocks, and feed rates of ash, metals, and total chloride and chlorine.

b. If specified by the license, carbon monoxide (CO), hydrocarbons (HC) and oxygen on a continuous basis at a common point in the boiler or industrial furnace downstream of the combustion zone and prior to release of stack gases to the atmosphere in accordance with operating requirements specified in par. (b)2. CO, HC and oxygen monitors shall be installed, operated and maintained in accordance with methods specified in Appendix IX.

c. Upon the request of the department, sampling and analysis of the hazardous waste (and other fuels and industrial furnace feedstocks as appropriate), residues and exhaust emissions shall be conducted to verify that the operating requirements established in the license achieve the applicable standards of ss. NR 666.104, 666.105, 666.106 and 666.107.

2. All monitors shall record data in units corresponding to the license limit unless otherwise specified in the license.

3. The boiler or industrial furnace and associated equipment (pumps, valves, pipes, fuel storage tanks, etc.) shall be subjected to thorough visual inspection when it contains hazardous waste, at least daily for leaks, spills, fugitive emissions and signs of tampering.

4. The automatic hazardous waste feed cutoff system and associated alarms shall be tested at least once every 7 days when hazardous waste is burned to verify operability, unless the applicant demonstrates to the department that weekly inspections will unduly restrict or upset operations and that less frequent inspections will be adequate. At a minimum, operational testing shall be conducted at least once every 30 days.

5. These monitoring and inspection data shall be recorded and the records shall be placed in the operating record required by s. NR 664.0073.

(i) *Direct transfer to the burner.* If hazardous waste is directly transferred from a transport vehicle to a boiler or industrial furnace without the use of a storage unit, the owner and operator shall comply with s. NR 666.111.

(j) *Recordkeeping.* The owner or operator shall keep in the operating record of the facility all information and data required by this section until closure of the facility.

(k) *Closure.* At closure, the owner or operator shall remove all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber waters and scrubber sludges) from the boiler or industrial furnace.

NR 666.103 Interim license standards for burners. (1) PURPOSE, SCOPE, APPLICABILITY (a) General. 1. The purpose of this section is to establish minimum national standards for owners and operators of "existing" boilers and industrial furnaces that burn hazardous waste where such standards define the acceptable management of hazardous waste during the period of interim license. The standards of this section apply to owners and operators of existing facilities until either a license is issued under s. NR 666.102(4) or until closure responsibilities identified in this section are fulfilled.

2. "Existing" or "in existence" means a boiler or industrial furnace that on or before August 21, 1991 is either in operation burning or processing hazardous waste or for which construction (including the

ancillary facilities to burn or to process the hazardous waste) has commenced. A facility has commenced construction if the owner or operator has obtained the federal, state and local approvals or licenses necessary to begin physical construction; and one of the following applies:

- a. A continuous on-site, physical construction program has begun.
- b. The owner or operator has entered into contractual obligations—which cannot be canceled or modified without substantial loss—for physical construction of the facility to be completed within a reasonable time.

3. If a boiler or industrial furnace is located at a facility that already has a license or interim license, then the facility shall comply with the applicable regulations dealing with license modifications in s. NR 670.042 or changes in interim license in s. NR 670.072.

(b) *Exemptions.* The requirements of this section do not apply to hazardous waste and facilities exempt under ss. NR 666.100(2) or 666.108.

(c) *Prohibition on burning dioxin-listed wastes.* The following hazardous waste listed for dioxin and hazardous waste derived from any of these wastes may not be burned in a boiler or industrial furnace operating under an interim license: F020, F021, F022, F023, F026 and F027.

(d) *Applicability of ch. NR 665 standards.* Owners and operators of boilers and industrial furnaces that burn hazardous waste and are operating under an interim license are subject to all of the following provisions of ch. NR 665, except as provided otherwise by this section:

1. In subch. A of ch. NR 665 (General), s. NR 665.0004.
2. In subch. B of ch. NR 665 (General facility standards), ss. NR 665.0011 to 665.0017.
3. In subch. C of ch. NR 665 (Preparedness and prevention), ss. NR 665.0031 to 665.0037.
4. In subch. D of ch. NR 665 (Contingency plan and emergency procedures), ss. NR 665.0051 to 665.0056.
5. In subch. E of ch. NR 665 (Manifest system, recordkeeping and reporting), ss. NR 665.0071 to 665.0077, except that ss. NR 665.0071, 665.0072 and 665.0076 do not apply to owners and operators of on-site facilities that do not receive any hazardous waste from off-site sources.
6. In subch. G of ch. NR 665 (Closure and long-term care), ss. NR 665.0111 to 665.0115.
7. In subch. H of ch. NR 665 (Financial requirements), ss. NR 665.0141, 665.0142, 665.0143 and 665.0147 to 665.0151, except that states and the federal government are exempt from s. NR 665.0147.
8. Subchapter BB of ch. NR 665 (Air emission standards for equipment leaks), except s. NR 665.1050(1).

(e) *Special requirements for furnaces.* The following controls apply during an interim license to industrial furnaces (e.g., kilns, cupolas) that feed hazardous waste for a purpose other than solely as an ingredient (see subd. 2.) at any location other than the hot end where products are normally discharged or where fuels are normally fired:

1. ‘Controls.’
 - a. The hazardous waste shall be fed at a location where combustion gas temperatures are at least 1800 °F.
 - b. The owner or operator shall determine that adequate oxygen is present in combustion gases to combust organic constituents in the waste and retain documentation of such determination in the facility record.
 - c. For cement kiln systems, the hazardous waste shall be fed into the kiln.
 - d. The hydrocarbon controls of s. NR 666.104(3) or sub. (3)(e) apply upon certification of compliance under sub. (3) irrespective of the CO level achieved during the compliance test.
2. ‘Burning hazardous waste solely as an ingredient.’ A hazardous waste is burned for a purpose other than solely as an ingredient if it meets one of these criteria:
 - a. The hazardous waste has a total concentration of nonmetal compounds listed in ch. NR 661, Appendix VIII, exceeding 500 ppm by weight, as-fired, and so is considered to be burned for destruction. The concentration of nonmetal compounds in a waste as-generated may be reduced to the 500 ppm limit

by bona fide treatment that removes or destroys nonmetal constituents. Blending for dilution to meet the 500 ppm limit is prohibited and documentation that the waste has not been impermissibly diluted shall be retained in the facility record.

b. The hazardous waste has a heating value of 5,000 Btu/lb or more, as-fired, and so is considered to be burned as fuel. The heating value of a waste as-generated may be reduced to below the 5,000 Btu/lb limit by bona fide treatment that removes or destroys organic constituents. Blending to augment the heating value to meet the 5,000 Btu/lb limit is prohibited and documentation that the waste has not been impermissibly blended shall be retained in the facility record.

(f) *Restrictions on burning hazardous waste that is not a fuel.* Prior to certification of compliance under sub. (3), owners and operators may not feed hazardous waste that has a heating value less than 5,000 Btu/lb, as-generated, (except that the heating value of a waste as-generated may be increased to above the 5,000 Btu/lb limit by bona fide treatment; however, blending to augment the heating value to meet the 5,000 Btu/lb limit is prohibited and records shall be kept to document that impermissible blending has not occurred) in a boiler or industrial furnace, except that:

1. Hazardous waste may be burned solely as an ingredient.
2. Hazardous waste may be burned for purposes of compliance testing (or testing prior to compliance testing) for a total period of time not to exceed 720 hours.

3. Such waste may be burned if the department has documentation to show that, prior to August 21, 1991, all of the following conditions were met:

- a. The boiler or industrial furnace was operating under the interim license standards for incinerators provided by subch. O of ch. NR 665, or the interim license standards for thermal treatment units provided by subch. P of ch. NR 665.

- b. The boiler or industrial furnace met the interim license eligibility requirements under s. NR 670.70 for subch. O or subch. P of ch. NR 665.

- c. Hazardous waste with a heating value less than 5,000 Btu/lb was burned prior to that date.

4. Such waste may be burned in a halogen acid furnace if the waste was burned as an excluded ingredient under s. NR 661.02(5) prior to February 21, 1991 and documentation is kept on file supporting this claim.

(g) *Direct transfer to the burner.* If hazardous waste is directly transferred from a transport vehicle to a boiler or industrial furnace without the use of a storage unit, the owner and operator shall comply with s. NR 666.111.

(2) CERTIFICATION OF PRECOMPLIANCE (a) *General.* The owner or operator shall provide complete and accurate information specified in par. (b) to the department on or before August 21, 1991, and shall establish limits for the operating parameters specified in par. (c). Such information is termed a "certification of precompliance" and constitutes a certification that the owner or operator has determined that, when the facility is operated within the limits specified in par. (c), the owner or operator believes that, using best engineering judgment, emissions of particulate matter, metals, HCl and Cl₂ are not likely to exceed the limits provided by ss. NR 666.105, 666.106 and 666.107. The facility may burn hazardous waste only under the operating conditions that the owner or operator establishes under par. (c) until the owner or operator submits a revised certification of precompliance under par. (h) or a certification of compliance under sub.(3), or until a license is issued.

(b) *Information required.* All of the following information shall be submitted with the certification of precompliance to support the determination that the limits established for the operating parameters identified in par.(c) are not likely to result in an exceedance of the allowable emission rates for particulate matter, metals, HCl and Cl₂:

1. General facility information:

- a. EPA facility ID number.

- b. Facility name, contact person, telephone number and address.

c. Description of boilers and industrial furnaces burning hazardous waste, including type and capacity of device.

d. A scaled plot plan showing the entire facility and location of the boilers and industrial furnaces burning hazardous waste.

e. A description of the air pollution control system on each device burning hazardous waste, including the temperature of the flue gas at the inlet to the particulate matter control system.

2. Except for facilities complying with the Tier I or adjusted Tier I feed rate screening limits for metals or total chlorine and chloride provided by ss. NR 666.106 (2) or (5) and 666.107(2)(a) or (5), respectively, the estimated uncontrolled (at the inlet to the air pollution control system) emissions of particulate matter, each metal controlled by s. NR 666.106, and hydrogen chloride and chlorine, and all of the following information to support such determinations:

a. The feed rate (lb/hr) of ash, chlorine, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver and thallium in each feedstream (hazardous waste, other fuels, industrial furnace feedstocks).

b. The estimated partitioning factor to the combustion gas for the materials identified in subd. 2.a. and the basis for the estimate and an estimate of the partitioning to HCl and Cl₂ of total chloride and chlorine in feed materials. To estimate the partitioning factor, the owner or operator shall use either best engineering judgment or the procedures specified in Appendix IX.

c. For industrial furnaces that recycle collected particulate matter (PM) back into the furnace and that will certify compliance with the metals emissions standards under sub. (3)(c)2.a., the estimated enrichment factor for each metal. To estimate the enrichment factor, the owner or operator shall use either best engineering judgment or the procedures specified in "Alternative Methodology for Implementing Metals Controls" in Appendix IX.

d. If best engineering judgment is used to estimate partitioning factors or enrichment factors under subd. 2.b. or c. respectively, the basis for the judgment. When best engineering judgment is used to develop or evaluate data or information and make determinations under this section, the determinations shall be made by a qualified, registered professional engineer and a certification of the engineer's determinations in accordance with s. NR 670.011(4) shall be provided in the certification of precompliance.

3. For facilities complying with the Tier I or adjusted Tier I feed rate screening limits for metals or total chlorine and chloride provided by ss. NR 666.106 (2) or (5) and 666.107(2)(a) or (5), the feed rate (lb/hr) of total chloride and chlorine, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver and thallium in each feed stream (hazardous waste, other fuels, industrial furnace feedstocks).

4. For facilities complying with the Tier II or Tier III emission limits for metals or HCl and Cl₂ (under ss. NR 666.106 (3) or (4) or 666.107(2)(b) or (3)), the estimated controlled (outlet of the air pollution control system) emissions rates of particulate matter, each metal controlled by s. NR 666.106, and HCl and Cl₂, and the following information to support such determinations:

a. The estimated air pollution control system (APCS) removal efficiency for particulate matter, HCl, Cl₂, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver and thallium.

b. To estimate APCS removal efficiency, the owner or operator shall use either best engineering judgment or the procedures prescribed in Appendix IX.

c. If best engineering judgment is used to estimate APCS removal efficiency, the basis for the judgment. Use of best engineering judgment shall be in conformance with provisions of subd. 2.d..

5. Determination of allowable emissions rates for HCl, Cl₂, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver and thallium, and the following information to support such determinations:

a. For all facilities, all of the following:

- 1) Physical stack height.
- 2) Good engineering practice stack height as defined by 40 CFR 51.100(ii).
- 3) Maximum flue gas flow rate.
- 4) Maximum flue gas temperature.
- 5) Attach a US geological service topographic map (or equivalent) showing the facility location and surrounding land within 5 km of the facility.
- 6) Identify terrain type: complex or noncomplex.
- 7) Identify land use: urban or rural.
- b. For owners and operators using Tier III site specific dispersion modeling to determine allowable levels under s. NR 666.106(4) or 666.107(3), or adjusted Tier I feed rate screening limits under s. NR 666.106(5) or 666.107(5):
 - 1) Dispersion model and version used.
 - 2) Source of meteorological data.
 - 3) The dilution factor in micrograms per cubic meter per gram per second of emissions for the maximum annual average off-site (unless on-site is required) ground level concentration (MEI location).
 - 4) Indicate the MEI location on the map required under subd. 5.a.5).
6. For facilities complying with the Tier II or III emissions rate controls for metals or HCl and Cl₂, a comparison of the estimated controlled emissions rates determined under subd. 4. with the allowable emission rates determined under subd. 5.
7. For facilities complying with the Tier I (or adjusted Tier I) feed rate screening limits for metals or total chloride and chlorine, a comparison of actual feed rates of each metal and total chlorine and chloride determined under subd. 3. to the Tier I allowable feed rates.
8. For industrial furnaces that feed hazardous waste for any purpose other than solely as an ingredient (as defined by sub. (1)(e)2.) at any location other than the product discharge end of the device, documentation of compliance with sub. (1)(e)1.a., b. and c.
9. For industrial furnaces that recycle collected particulate matter (PM) back into the furnace and that will certify compliance with the metals emissions standards under sub. (3)(c)2.a., both of the following:
 - a. The applicable particulate matter standard in lb/hr.
 - b. The precompliance limit on the concentration of each metal in collected PM.
- (c) *Limits on operating conditions.* The owner and operator shall establish limits on the following parameters consistent with the determinations made under par. (b) and certify (under provisions of par. (i)) to the department that the facility will operate within the limits during interim license when there is hazardous waste in the unit until revised certification of precompliance under par. (h) or certification of compliance under sub. (3):
 1. Feed rate of total hazardous waste and (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5)) pumpable hazardous waste.
 2. Feed rate of each metal in all of the following feed streams:
 - a. Total feed streams, except that industrial furnaces that comply with the alternative metals implementation approach under par. (d) shall specify limits on the concentration of each metal in collected particulate matter in lieu of feed rate limits for total feedstreams.
 - b. Total hazardous waste feed, unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5).
 - c. Total pumpable hazardous waste feed, unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5).
 3. Total feed rate of chlorine and chloride in total feed streams.
 4. Total feed rate of ash in total feed streams, except that the ash feed rate for cement kilns and light-weight aggregate kilns is not limited.

5. Maximum production rate of the device in appropriate units when producing normal product, unless complying with the Tier I or adjusted Tier I feed rate screening limits for chlorine under s. NR 666.107(2)(a) or (5) and for all metals under s. NR 666.106(2) or (5), and the uncontrolled particulate emissions do not exceed the standard under s. NR 666.105.

(d) *Operating requirements for furnaces that recycle PM.* Owners and operators of furnaces that recycle collected particulate matter (PM) back into the furnace and that will certify compliance with the metals emissions controls under sub. (3)(c)2.a. shall comply with the special operating requirements provided in "Alternative Methodology for Implementing Metals Controls" in Appendix IX.

(e) *Measurement of feed rates and production rate* 1. 'General requirements.' Limits on each of the parameters specified in par. (c) (except for limits on metals concentrations in collected particulate matter (PM) for industrial furnaces that recycle collected PM) shall be established and continuously monitored under either of the following methods:

a. A limit for a parameter may be established and continuously monitored and recorded on an instantaneous basis (i.e., the value that occurs at any time) not to be exceeded at any time.

b. A limit for a parameter may be established and continuously monitored on an hourly rolling average basis defined as follows:

1) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

2) An hourly rolling average is the arithmetic mean of the 60 most recent 1-minute average values recorded by the continuous monitoring system.

2. 'Rolling average limits for carcinogenic metals and lead.' Feed rate limits for the carcinogenic metals (arsenic, beryllium, cadmium and chromium) and lead may be established either on an hourly rolling average basis as prescribed by subd. 1.b. or on (up to) a 24 hour rolling average basis. If the owner or operator elects to use an averaging period from 2 to 24 hours:

a. The feed rate of each metal shall be limited at any time to 10 times the feed rate that would be allowed on a hourly rolling average basis.

b. The continuous monitor shall meet all of the following specifications:

1) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

2) The rolling average for the selected averaging period is defined as the arithmetic mean of one hour block averages for the averaging period. A one hour block average is the arithmetic mean of the one minute averages recorded during the 60-minute period beginning at one minute after the beginning of preceding clock hour.

3. 'Feed rate limits for metals, total chloride and chlorine, and ash.' Feed rate limits for metals, total chlorine and chloride, and ash are established and monitored by knowing the concentration of the substance (i.e., metals, chloride and chlorine, and ash) in each feedstream and the flow rate of the feedstream. To monitor the feed rate of these substances, the flow rate of each feedstream shall be monitored under the continuous monitoring requirements of subd. 1. and 2.

(f) *Public notice requirements at precompliance.* On or before August 21, 1991 the owner or operator shall submit a notice with the following information for publication in a major local newspaper of general circulation and send a copy of the notice to the appropriate units of state and local government. The owner and operator shall provide to the department with the certification of precompliance evidence of submitting the notice for publication. The notice, which shall be entitled "Notice of Certification of Precompliance with Hazardous Waste Burning Requirements of s. NR 666.103(2), Wis. Adm. Code", shall include all of the following:

1. Name and address of the owner and operator of the facility as well as the location of the device burning hazardous waste.
2. Date that the certification of precompliance is submitted to the department.
3. Brief description of the regulatory process required to comply with the interim license requirements including required emissions testing to demonstrate conformance with emissions standards for organic compounds, particulate matter, metals, HCl and Cl₂.
4. Types and quantities of hazardous waste burned including, but not limited to, source, whether solids or liquids, as well as an appropriate description of the waste.
5. Type of device or devices in which the hazardous waste is burned including a physical description and maximum production rate of each device.
6. Types and quantities of other fuels and industrial furnace feedstocks fed to each unit.
7. Brief description of the basis for this certification of precompliance as specified in par. (b).
8. Locations where the record for the facility can be viewed and copied by interested parties. These records and locations shall at a minimum include both of the following:
 - a. The administrative record kept by the department office where the supporting documentation was submitted or another location designated by the department.
 - b. The BIF correspondence file kept at the facility site where the device is located. The correspondence file shall include all correspondence between the facility and the department, state and local regulatory officials, including copies of all certifications and notifications, such as the precompliance certification, precompliance public notice, notice of compliance testing, compliance test report, compliance certification, time extension requests and approvals or denials, enforcement notifications of violations, and copies of EPA and state site visit reports submitted to the owner or operator.
9. Notification of the establishment of a facility mailing list whereby interested parties may notify the department that they wish to be placed on the mailing list to receive future information and notices about this facility.
10. Location (mailing address) of the department bureau of waste management where further information can be obtained on department regulation of hazardous waste burning.
 - (g) *Monitoring other operating parameters.* When the monitoring systems for the operating parameters listed in sub. (3)(a)5. to 13. are installed and operating in conformance with vendor specifications or (for CO, HC and oxygen) specifications provided by Appendix IX, as appropriate, the parameters shall be continuously monitored and records shall be maintained in the operating record.
 - (h) *Revised certification of precompliance.* The owner or operator may revise at any time the information and operating conditions documented under pars. (b) and (c) in the certification of precompliance by submitting a revised certification of precompliance under procedures provided by those paragraphs.
 1. The public notice requirements of par. (f) do not apply to recertifications.
 2. The owner and operator shall operate the facility within the limits established for the operating parameters under par. (c) until a revised certification is submitted under this paragraph or a certification of compliance is submitted under sub. (3).
 - (i) *Certification of precompliance statement.* The owner or operator shall include the following signed statement with the certification of precompliance submitted to the department:

"I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information and supporting documentation. Copies of all emissions tests, dispersion modeling results and other information used to determine conformance with s. NR 666.103(2) are available at the facility and can be obtained from the facility contact person listed above. Based on my inquiry of the person or persons who manages the facility, or those persons directly responsible for gathering the information, the

information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I also acknowledge that the operating limits established in this certification pursuant to s. NR 666.103(2) (c) and (d) are enforceable limits at which the facility can legally operate during interim license until: (1) A revised certification of precompliance is submitted, (2) a certification of compliance is submitted, or (3) an operating license is issued."

(3) CERTIFICATION OF COMPLIANCE. The owner or operator shall conduct emissions testing to document compliance with the emissions standards of ss. NR 666.104 (2) to (5), 666.105, 666.106, 666.107 and sub. (1)(e) l.d., under the procedures prescribed by this subsection, except under extensions of time provided by par. (g). Based on the compliance test, the owner or operator shall submit to the department on or before August 21, 1992 a complete and accurate "certification of compliance" (under par. (d)) with those emission standards establishing limits on the operating parameters specified in par. (a).

(a) Limits on operating conditions. The owner or operator shall establish limits on the following parameters based on operations during the compliance test (under procedures prescribed in par. (d)4.) or as otherwise specified and include these limits with the certification of compliance. The boiler or industrial furnace shall be operated in accordance with these operating limits and the applicable emissions standards of ss. NR 666.104(2) to (5), 666.105, 666.106, 666.107 and sub. (1)(e) l.d. at all times when there is hazardous waste in the unit.

1. Feed rate of total hazardous waste and (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5) and the total chlorine and chloride feed rate screening limits under s. NR 666.107(2) or (5)), pumpable hazardous waste.

2. Feed rate of each metal in the following feedstreams:

a. Total feedstreams, except that:

1) Facilities that comply with Tier I or adjusted Tier I metals feed rate screening limits may set their operating limits at the metals feed rate screening limits determined under s. NR 666.106(2) or (5).

2) Industrial furnaces that shall comply with the alternative metals implementation approach under par. (c)2. shall specify limits on the concentration of each metal in the collected particulate matter in lieu of feed rate limits for total feedstreams.

b. Total hazardous waste feed (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5)).

c. Total pumpable hazardous waste feed (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5)).

3. Total feed rate of chlorine and chloride in total feed streams, except that facilities that comply with Tier I or adjusted Tier I feed rate screening limits may set their operating limits at the total chlorine and chloride feed rate screening limits determined under s. NR 666.107(2)(a) or (5).

4. Total feed rate of ash in total feed streams, except that the ash feed rate for cement kilns and light-weight aggregate kilns is not limited.

5. Carbon monoxide concentration, and where required, hydrocarbon concentration in stack gas. When complying with the CO controls of s. NR 666.104(2), the CO limit is 100 ppmv, and when complying with the HC controls of s. NR 666.104(3), the HC limit is 20 ppmv. When complying with the CO controls of s. NR 666.104(3), the CO limit is established based on the compliance test.

6. Maximum production rate of the device in appropriate units when producing normal product, unless complying with the Tier I or adjusted Tier I feed rate screening limits for chlorine under s. NR 666.107(2)(a) or (5) and for all metals under s. NR 666.106(2) or (5), and the uncontrolled particulate emissions do not exceed the standard under s. NR 666.105.

7. Maximum combustion chamber temperature where the temperature measurement is as close to the combustion zone as possible and is upstream of any quench water injection (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5)).

8. Maximum flue gas temperature entering a particulate matter control device (unless complying with Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5) and the total chlorine and chloride feed rate screening limits under s. NR 666.107(2) or (5)).

9. For systems using wet scrubbers, including wet ionizing scrubbers (unless complying with Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2)(a) or (5)):

a. Minimum liquid to flue gas ration.

b. Minimum scrubber blowdown from the system or maximum suspended solids content of scrubber water.

c. Minimum pH level of the scrubber water.

10. For systems using venturi scrubbers, the minimum differential gas pressure across the venturi (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5) and the total chlorine and chloride feed rate screening limits under s. NR 666.107(2)(a) or (5)).

11. For systems using dry scrubbers (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5) and the total chlorine and chloride feed rate screening limits under s. NR 666.107(2)(a) or (5)):

a. Minimum caustic feed rate.

b. Maximum flue gas flow rate.

12. For systems using wet ionizing scrubbers or electrostatic precipitators (unless complying with the Tier I or adjusted Tier I metals feed rate screening limits under s. NR 666.106(2) or (5) and the total chlorine and chloride feed rate screening limits under s. NR 666.107(2)(a) or (5)):

a. Minimum electrical power in kilovolt amperes (kVA) to the precipitator plates.

b. Maximum flue gas flow rate.

13. For systems using fabric filters (baghouses), the minimum pressure drop (unless complying with the Tier I or adjusted Tier I metal feed rate screening limits under s. NR 666.106(2) or (5) and the total chlorine and chloride feed rate screening limits under s. NR 666.107(2)(a) or (5)).

(b) *Prior notice of compliance testing.* At least 30 days prior to the compliance testing required by par. (c), the owner or operator shall notify the department and submit all of the following information:

1. General facility information including:

a. EPA facility ID number.

b. Facility name, contact person, telephone number and address.

c. Person responsible for conducting compliance test, including company name, address and telephone number, and a statement of qualifications.

d. Planned date of the compliance test.

2. Specific information on each device to be tested including:

a. Description of boiler or industrial furnace.

b. A scaled plot plan showing the entire facility and location of the boiler or industrial furnace.

c. A description of the air pollution control system.

d. Identification of the continuous emission monitors that are installed, including:

1) Carbon monoxide monitor.

2) Oxygen monitor.

3) Hydrocarbon monitor, specifying the minimum temperature of the system and, if the temperature is less than 150 °C, an explanation of why a heated system is not used (see par. (e)) and a brief description of the sample gas conditioning system.

e. Indication of whether the stack is shared with another device that will be in operation during the compliance test.

f. Other information useful to an understanding of the system design or operation.

3. Information on the testing planned, including a complete copy of the test protocol and quality assurance/quality control (QA/QC) plan, and a summary description for each test providing all of the following information at a minimum:

a. Purpose of the test (e.g., demonstrate compliance with emissions of particulate matter).

b. Planned operating conditions, including levels for each pertinent parameter specified in par. (a).

(c) *Compliance testing* 1. 'General.' Compliance testing shall be conducted under conditions for which the owner or operator has submitted a certification of precompliance under sub. (2) and under conditions established in the notification of compliance testing required by par. (b). The owner or operator may seek approval on a case-by-case basis to use compliance test data from one unit in lieu of testing a similar onsite unit. To support the request, the owner or operator shall provide a comparison of the hazardous waste burned and other feedstreams, and the design, operation and maintenance of both the tested unit and the similar unit. The department shall provide a written approval to use compliance test data in lieu of testing a similar unit if it finds that the hazardous wastes, the devices and the operating conditions are sufficiently similar, and the data from the other compliance test is adequate to meet the requirements of this subsection.

2. 'Special requirements for industrial furnaces that recycle collected PM.' Owners and operators of industrial furnaces that recycle back into the furnace particulate matter (PM) from the air pollution control system shall comply with one of the following procedures for testing to determine compliance with the metals standards of s. NR 666.106(3) or (4):

a. The special testing requirements prescribed in "Alternative Method for Implementing Metals Controls" in Appendix IX.

b. Stack emissions testing for a minimum of 6 hours each day while hazardous waste is burned during an interim license. The testing shall be conducted when burning normal hazardous waste for that day at normal feed rates for that day and when the air pollution control system is operated under normal conditions. During an interim license, hazardous waste analysis for metals content shall be sufficient for the owner or operator to determine if changes in metals content may affect the ability of the facility to meet the metals emissions standards established under s. NR 666.106(3) or (4). Under this option, operating limits (under par. (a)) shall be established during compliance testing under this paragraph only on the following parameters:

1) Feed rate of total hazardous waste.

2) Total feed rate of chlorine and chloride in total feed streams.

3) Total feed rate of ash in total feed streams, except that the ash feed rate for cement kilns and light-weight aggregate kilns is not limited.

4) Carbon monoxide concentration, and where required, hydrocarbon concentration in stack gas.

5) Maximum production rate of the device in appropriate units when producing normal product.

c. Conduct compliance testing to determine compliance with the metals standards to establish limits on the operating parameters of par. (a) only after the kiln system has been conditioned to enable it to reach equilibrium with respect to metals fed into the system and metals emissions. During conditioning, hazardous waste and raw materials having the same metals content as will be fed during the compliance test shall be fed at the feed rates that will be fed during the compliance test.

3. 'Conduct of compliance testing.' a. If compliance with all applicable emissions standards of ss. NR 666.104 to 666.107 is not demonstrated simultaneously during a set of test runs, the operating conditions of additional test runs required to demonstrate compliance with remaining emissions standards shall be as close as possible to the original operating conditions.

b. Prior to obtaining test data for purposes of demonstrating compliance with the applicable emissions standards of ss. NR 666.104 to 666.107 or establishing limits on operating parameters under this section, the facility shall operate under compliance test conditions for a sufficient period to reach steady-state operations. Industrial furnaces that recycle collected particulate matter back into the furnace and that comply with subd. 2.a. or b., however, need not reach steady state conditions with respect to the flow of metals in the system prior to beginning compliance testing for metals.

c. Compliance test data on the level of an operating parameter for which a limit shall be established in the certification of compliance shall be obtained during emissions sampling for the pollutant or pollutants (i.e., metals, PM, HCl/Cl₂, organic compounds) for which the parameter shall be established as specified by par. (a).

(d) *Certification of compliance.* Within 90 days of completing compliance testing, the owner or operator shall certify to the department compliance with the emissions standards of ss. NR 666.104 (2), (3) and (5), 666.105, 666.106, 666.107 and sub. (1)(e)1.d.. The certification of compliance shall include all of the following information:

1. General facility and testing information including:
 - a. EPA facility ID number.
 - b. Facility name, contact person, telephone number and address.
 - c. Person responsible for conducting compliance testing, including company name, address and telephone number, and a statement of qualifications.
 - d. Date or dates of each compliance test.
 - e. Description of boiler or industrial furnace tested.
 - f. Person responsible for quality assurance/quality control (QA/QC), title and telephone number, and statement that procedures prescribed in the QA/QC plan submitted under s. NR 666.103(3)(b)3. have been followed, or a description of any changes and an explanation of why changes were necessary.
 - g. Description of any changes in the unit configuration prior to or during testing that would alter any of the information submitted in the prior notice of compliance testing under par. (b), and an explanation of why the changes were necessary.
 - h. Description of any changes in the planned test conditions prior to or during the testing that alter any of the information submitted in the prior notice of compliance testing under par. (b), and an explanation of why the changes were necessary.
 - i. The complete report on results of emissions testing.
2. Specific information on each test including:
 - a. Purpose or purposes of test (e.g., demonstrate conformance with the emissions limits for particulate matter, metals, HCl, Cl₂, and CO).
 - b. Summary of test results for each run and for each test including the following information:
 - 1) Date of run.
 - 2) Duration of run.
 - 3) Time-weighted average and highest hourly rolling average CO level for each run and for the test.
 - 4) Highest hourly rolling average HC level, if HC monitoring is required for each run and for the test.
 - 5) If dioxin and furan testing is required under s. NR 666.104(5), time-weighted average emissions for each run and for the test of chlorinated dioxin and furan emissions, and the predicted maximum annual average ground level concentration of the toxicity equivalency factor.
 - 6) Time-weighted average particulate matter emissions for each run and for the test.
 - 7) Time-weighted average HCl and Cl₂ emissions for each run and for the test.
 - 8) Time-weighted average emissions for the metals subject to regulation under s. NR 666.106 for each run and for the test.
 - 9) QA/QC results.

3. Comparison of the actual emissions during each test with the emissions limits prescribed by ss. NR 666.104 (2), (3) and (5), 666.105, 666.106 and 666.107 and established for the facility in the certification of precompliance under sub. (2).

4. Determination of operating limits based on all valid runs of the compliance test for each applicable parameter listed in par. (a) using either of the following procedures:

a. A parameter may be measured and recorded on an instantaneous basis (i.e., the value that occurs at any time) and the operating limit specified as the time-weighted average during all runs of the compliance test.

b. 1) The limit for a parameter may be established and continuously monitored on an hourly rolling average basis defined as follows:

a) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

b) An hourly rolling average is the arithmetic mean of the 60 most recent 1-minute average values recorded by the continuous monitoring system.

2) The operating limit for the parameter shall be established based on compliance test data as the average over all test runs of the highest hourly rolling average value for each run.

c. Feed rate limits for the carcinogenic metals (i.e., arsenic, beryllium, cadmium and chromium) and lead may be established either on an hourly rolling average basis as prescribed by subd. 4.b. or on (up to) a 24 hour rolling average basis. If the owner or operator elects to use an averaging period from 2 to 24 hours:

1) The feed rate of each metal shall be limited at any time to 10 times the feed rate that would be allowed on a hourly rolling average basis.

2) The continuous monitor shall meet the following specifications:

a) A continuous monitor is one which continuously samples the regulated parameter without interruption, and evaluates the detector response at least once each 15 seconds, and computes and records the average value at least every 60 seconds.

b) The rolling average for the selected averaging period is defined as arithmetic mean of one hour block averages for the averaging period. A one hour block average is the arithmetic mean of the one minute averages recorded during the 60-minute period beginning at one minute after the beginning of preceding clock hour.

3) The operating limit for the feed rate of each metal shall be established based on compliance test data as the average over all test runs of the highest hourly rolling average feed rate for each run.

d. Feed rate limits for metals, total chlorine and chloride, and ash are established and monitored by knowing the concentration of the substance (i.e., metals, chloride and chlorine, and ash) in each feedstream and the flow rate of the feedstream. To monitor the feed rate of these substances, the flow rate of each feedstream shall be monitored under the continuous monitoring requirements of subd. 4.a. to c.

5. The following statement shall accompany the certification of compliance:

"I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information and supporting documentation. Copies of all emissions tests, dispersion modeling results and other information used to determine conformance with s. NR 666.103(3) are available at the facility and can be obtained from the facility contact person listed above. Based on my inquiry of the person or persons who manages the facility, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I also acknowledge that the operating conditions established in this certification pursuant to s. NR 666.103(3)(d)4. are enforceable limits at which the facility can legally operate during an interim license until a revised certification of compliance is submitted."

(e) *Special requirements for HC monitoring systems.* When an owner or operator is required to comply with the hydrocarbon (HC) controls provided by s. NR 666.104(3) or sub. (1)(e)1.d., a conditioned gas monitoring system may be used in conformance with specifications provided in Appendix IX if the owner or operator submits a certification of compliance without using extensions of time provided by par. (g).

(f) *Special operating requirements for industrial furnaces that recycle collected PM.* Owners and operators of industrial furnaces that recycle back into the furnace particulate matter (PM) from the air pollution control system shall do all of the following:

1. When complying with par. (c)2.a., comply with the operating requirements prescribed in "Alternative Method to Implement the Metals Controls" in Appendix IX.
2. When complying with par. (c)2.b., comply with the operating requirements prescribed by that subdivision paragraph.

(g) *Extensions of time.* 1. If the owner or operator does not submit a complete certification of compliance for all of the applicable emissions standards of ss. NR 666.104, 666.105, 666.106 and 666.107 by August 21, 1992, the owner or operator shall do one of the following:

a. Stop burning hazardous waste and begin closure activities under sub. (12) for the hazardous waste portion of the facility.

b. Limit hazardous waste burning only for purposes of compliance testing (and pretesting to prepare for compliance testing) a total period of 720 hours for the period of time beginning August 21, 1992, submit a notification to the department by August 21, 1992 stating that the facility is operating under restricted interim license and intends to resume burning hazardous waste, and submit a complete certification of compliance by August 23, 1993.

c. Obtain a case-by-case extension of time under subd. 2.

2. The owner or operator may request a case-by-case extension of time to extend any time limit provided by this paragraph if compliance with the time limit is not practicable for reasons beyond the control of the owner or operator.

a. In granting an extension, the department may apply conditions as the facts warrant to ensure timely compliance with this section and that the facility operates in a manner that does not pose a hazard to human health and the environment.

b. When an owner or operator requests an extension of time to enable the facility to comply with the alternative hydrocarbon provisions of s. NR 666.104(6) and obtain a hazardous waste license because the facility cannot meet the HC limit of s. NR 666.104(3):

1) The department shall, in considering whether to grant the extension, do all of the following:

a) Determine whether the owner and operator have submitted in a timely manner a complete feasibility and plan of operation report that includes information required under s. NR 670.022(2).

b) Consider whether the owner and operator have made a good faith effort to certify compliance with all other emission controls, including the controls on dioxins and furans of s. NR 666.104(5) and the controls on PM, metals, HCl and Cl₂.

2) If an extension is granted, the department shall, as a condition of the extension, require the facility to operate under flue gas concentration limits on CO and HC that, based on available information, including information in the feasibility and plan of operation report, are baseline CO and HC levels as defined by s. NR 666.104(6)(a).

(h) *Revised certification of compliance.* The owner or operator may submit at any time a revised certification of compliance (recertification of compliance) under the following procedures:

1. Prior to submittal of a revised certification of compliance, hazardous waste may not be burned for more than a total of 720 hours under operating conditions that exceed those established under a current certification of compliance, and such burning may be conducted only for purposes of determining whether the facility can operate under revised conditions and continue to meet the applicable emissions standards of ss. NR 666.104, 666.105, 666.106 and 666.107.

2. At least 30 days prior to first burning hazardous waste under operating conditions that exceed those established under a current certification of compliance, the owner or operator shall notify the department and submit the following information:

- a. EPA facility ID number, and facility name, contact person, telephone number and address.
- b. Operating conditions that the owner or operator is seeking to revise and description of the changes in facility design or operation that prompted the need to seek to revise the operating conditions.
- c. A determination that when operating under the revised operating conditions, the applicable emissions standards of ss. NR 666.104, 666.105, 666.106 and 666.107 are not likely to be exceeded. To document this determination, the owner or operator shall submit the applicable information required under sub. (2)(b).
- d. Complete emissions testing protocol for any pretesting and for a new compliance test to determine compliance with the applicable emissions standards of ss. NR 666.104, 666.105, 666.106 and 666.107 when operating under revised operating conditions. The protocol shall include a schedule of pre-testing and compliance testing. If the owner or operator revises the scheduled date for the compliance test, the owner or operator shall notify the department in writing at least 30 days prior to the revised date of the compliance test.

3. Conduct a compliance test under the revised operating conditions and the protocol submitted to the department to determine compliance with the applicable emissions standards of ss. NR 666.104, 666.105, 666.106 and 666.107.

4. Submit a revised certification of compliance under par. (d).

(4) PERIODIC RECERTIFICATIONS. The owner or operator shall conduct compliance testing and submit to the department a recertification of compliance under provisions of sub. (3) within 3 years from submitting the previous certification or recertification. If the owner or operator seeks to recertify compliance under new operating conditions, the owner or operator shall comply with sub. (3)(h).

(5) NONCOMPLIANCE WITH CERTIFICATION SCHEDULE. If the owner or operator does not comply with the interim license compliance schedule provided by subs. (2), (3) and (4), hazardous waste burning shall terminate on the date that the deadline is missed, closure activities shall begin under sub. (12), and hazardous waste burning may not resume except under an operating license issued under s. NR 670.066. For purposes of compliance with the closure provisions of sub. (12) and ss. NR 665.0112(4)(b) and 665.0113 the boiler or industrial furnace has received "the known final volume of hazardous waste" on the date that the deadline is missed.

(6) STARTUP AND SHUTDOWN. Hazardous waste (except waste fed solely as an ingredient under the Tier I (or adjusted Tier I) feed rate screening limits for metals and chloride and chlorine) may not be fed into the device during startup and shutdown of the boiler or industrial furnace, unless the device is operating within the conditions of operation specified in the certification of compliance.

(7) AUTOMATIC WASTE FEED CUTOFF. During the compliance test required by sub. (3)(c), and upon certification of compliance under sub. (3), a boiler or industrial furnace shall be operated with a functioning system that automatically cuts off the hazardous waste feed when the applicable operating conditions specified in sub. (3)(a)1. and 5. to 13. deviate from those established in the certification of compliance. In addition:

(a) To minimize emissions of organic compounds, the minimum combustion chamber temperature (or the indicator of combustion chamber temperature) that occurred during the compliance test shall be

maintained while hazardous waste or hazardous waste residues remain in the combustion chamber, with the minimum temperature during the compliance test defined as either of the following:

1. If compliance with the combustion chamber temperature limit is based on a hourly rolling average, the minimum temperature during the compliance test is considered to be the average over all runs of the lowest hourly rolling average for each run.

2. If compliance with the combustion chamber temperature limit is based on an instantaneous temperature measurement, the minimum temperature during the compliance test is considered to be the time-weighted average temperature during all runs of the test.

(b) Operating parameters limited by the certification of compliance shall continue to be monitored during the cutoff, and the hazardous waste feed may not be restarted until the levels of those parameters comply with the limits established in the certification of compliance.

(8) FUGITIVE EMISSIONS. Fugitive emissions shall be controlled by one of the following:

- (a) Keeping the combustion zone totally sealed against fugitive emissions.

- (b) Maintaining the combustion zone pressure lower than atmospheric pressure.

- (c) An alternate means of control that the owner or operator can demonstrate provide fugitive emissions control equivalent to maintenance of combustion zone pressure lower than atmospheric pressure. Support for such demonstration shall be included in the operating record.

(9) CHANGES. A boiler or industrial furnace shall cease burning hazardous waste when changes in combustion properties, or feed rates of the hazardous waste, other fuels, or industrial furnace feedstocks, or changes in the boiler or industrial furnace design or operating conditions deviate from the limits specified in the certification of compliance.

(10) MONITORING AND INSPECTIONS. (a) The owner or operator shall monitor and record all of the following, at a minimum, while burning hazardous waste:

1. Feed rates and composition of hazardous waste, other fuels, and industrial furnace feed stocks, and feed rates of ash, metals, and total chloride and chlorine as necessary to ensure conformance with the certification of precompliance or certification of compliance.

2. Carbon monoxide (CO), oxygen, and if applicable, hydrocarbons (HC), on a continuous basis at a common point in the boiler or industrial furnace downstream of the combustion zone and prior to release of stack gases to the atmosphere in accordance with the operating limits specified in the certification of compliance. CO, HC and oxygen monitors shall be installed, operated and maintained in accordance with methods specified in Appendix IX.

3. Upon the request of the department, sampling and analysis of the hazardous waste (and other fuels and industrial furnace feed stocks as appropriate) and the stack gas emissions shall be conducted to verify that the operating conditions established in the certification of precompliance or certification of compliance achieve the applicable standards of ss. NR 666.104, 666.105, 666.106 and 666.107.

(b) The boiler or industrial furnace and associated equipment (pumps, valves, pipes, fuel storage tanks, etc.) shall be subjected to thorough visual inspection when they contain hazardous waste, at least daily for leaks, spills, fugitive emissions and signs of tampering.

(c) The automatic hazardous waste feed cutoff system and associated alarms shall be tested at least once every 7 days when hazardous waste is burned to verify operability, unless the owner or operator can demonstrate that weekly inspections will unduly restrict or upset operations and that less frequent inspections will be adequate. Support for such demonstration shall be included in the operating record. At a minimum, operational testing shall be conducted at least once every 30 days.

(d) These monitoring and inspection data shall be recorded and the records shall be placed in the operating log.

(11) RECORDKEEPING. The owner or operator shall keep in the operating record of the facility all information and data required by this section until closure of the boiler or industrial furnace unit.

(12) CLOSURE. At closure, the owner or operator shall remove all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber waters and scrubber sludges) from the boiler or industrial furnace and shall comply with ss. NR 665.0111 to 665.0115 .

NR 666.104 Standards to control organic emissions. **(1) DRE STANDARD** (a) *General.* Except as provided in par. (c), a boiler or industrial furnace burning hazardous waste shall achieve a destruction and removal efficiency (DRE) of 99.99% for all organic hazardous constituents in the waste feed. To demonstrate conformance with this requirement, 99.99% DRE shall be demonstrated during a trial burn for each principal organic hazardous constituent (POHC) designated (under par. (b)) in its license for each waste feed. DRE is determined for each POHC from the following equation:

$$DRE = \left[1 - \frac{W_{out}}{W_{in}} \right] \times 100$$

where:

W_{in} = Mass feed rate of one principal organic hazardous constituent (POHC) in the hazardous waste fired to the boiler or industrial furnace

W_{out} = Mass emission rate of the same POHC present in stack gas prior to release to the atmosphere

(b) *Designation of POHCs.* Principal organic hazardous constituents (POHCs) are those compounds for which compliance with the DRE requirements shall be demonstrated in a trial burn in conformance with procedures prescribed in s. NR 670.066. One or more POHCs shall be designated by the department for each waste feed to be burned. POHCs shall be designated based on the degree of difficulty of destruction of the organic constituents in the waste and on their concentrations or mass in the waste feed considering the results of waste analyses submitted with the feasibility and plan of operation report. POHCs are most likely to be selected from among those compounds listed in ch. 661, Appendix VIII that are also present in the normal waste feed. However, if the applicant demonstrates to the department's satisfaction that a compound not listed in Appendix VIII or not present in the normal waste feed is a suitable indicator of compliance with the DRE requirements, that compound may be designated as a POHC. Such POHCs need not be toxic or organic compounds.

(c) *Dioxin-listed waste.* A boiler or industrial furnace burning hazardous waste containing (or derived from) EPA hazardous waste numbers F020, F021, F022, F023, F026 or F027 shall achieve a destruction and removal efficiency (DRE) of 99.9999% for each POHC designated (under par. (b)) in its license. This performance shall be demonstrated on POHCs that are more difficult to burn than tetra-, penta- and hexachlorodibenzo-*p*-dioxins and dibenzofurans. DRE is determined for each POHC from the equation in par. (a). In addition, the owner or operator of the boiler or industrial furnace shall notify the department of intent to burn EPA hazardous waste numbers F020, F021, F022, F023, F026 or F027.

(d) *Automatic waiver of DRE trial burn.* Owners and operators of boilers operated under the special operating requirements provided by s. NR 666.110 are considered to be in compliance with the DRE standard of par. (a) and are exempt from the DRE trial burn.

(e) *Low risk waste.* Owners and operators of boilers or industrial furnaces that burn hazardous waste in compliance with s. NR 666.109(1) are considered to be in compliance with the DRE standard of par. (a) and are exempt from the DRE trial burn.

(2) CARBON MONOXIDE STANDARD. (a) Except as provided in sub. (3), the stack gas concentration of carbon monoxide (CO) from a boiler or industrial furnace burning hazardous waste cannot exceed 100 ppmv on an hourly rolling average basis (i.e., over any 60 minute period), continuously corrected to 7% oxygen, dry gas basis.

(b) CO and oxygen shall be continuously monitored in conformance with “Performance Specifications for Continuous Emission Monitoring of Carbon Monoxide and Oxygen for Incinerators, Boilers and Industrial Furnaces Burning Hazardous Waste” in Appendix IX.

(c) Compliance with the 100 ppmv CO limit shall be demonstrated during the trial burn (for new facilities or an interim license facility applying for an operating license) or the compliance test (for interim license facilities). To demonstrate compliance, the highest hourly rolling average CO level during any valid run of the trial burn or compliance test may not exceed 100 ppmv.

(3) ALTERNATIVE CARBON MONOXIDE STANDARD. (a) The stack gas concentration of carbon monoxide (CO) from a boiler or industrial furnace burning hazardous waste may exceed the 100 ppmv limit if stack gas concentrations of hydrocarbons (HC) do not exceed 20 ppmv, except as provided by sub. (6) for certain industrial furnaces.

(b) HC limits shall be established under this section on an hourly rolling average basis (i.e., over any 60 minute period), reported as propane, and continuously corrected to 7% oxygen, dry gas basis.

(c) HC shall be continuously monitored in conformance with “Performance Specifications for Continuous Emission Monitoring of Hydrocarbons for Incinerators, Boilers and Industrial Furnaces Burning Hazardous Waste” in Appendix IX. CO and oxygen shall be continuously monitored in conformance with sub. (2)(b).

(d) The alternative CO standard is established based on CO data during the trial burn (for a new facility) and the compliance test (for an interim license facility). The alternative CO standard is the average over all valid runs of the highest hourly average CO level for each run. The CO limit is implemented on an hourly rolling average basis, and continuously corrected to 7% oxygen, dry gas basis.

(4) SPECIAL REQUIREMENTS FOR FURNACES. Owners and operators of industrial furnaces (e.g., kilns, cupolas) that feed hazardous waste for a purpose other than solely as an ingredient (see s. NR 666.103(1)(e)2.) at any location other than the end where products are normally discharged and where fuels are normally fired shall comply with the hydrocarbon limits provided by sub. (3) or (6) irrespective of whether stack gas CO concentrations meet the 100 ppmv limit of sub. (2).

(5) CONTROLS FOR DIOXINS AND FURANS. Owners and operators of boilers and industrial furnaces that are equipped with a dry particulate matter control device that operates within the temperature range of 450 to 750 °F, and industrial furnaces operating under an alternative hydrocarbon limit established under sub. (6) shall conduct a site-specific risk assessment as follows to demonstrate that emissions of chlorinated dibenzo-p-dioxins and dibenzofurans do not result in an increased lifetime cancer risk to the hypothetical maximum exposed individual (MEI) exceeding 1 in 100,000:

(a) During the trial burn (for new facilities or an interim license facility applying for an operating license) or compliance test (for interim license facilities), determine emission rates of the tetra-octa congeners of chlorinated dibenzo-p-dioxins and dibenzofurans (CDDs/CDFs) using Method 0023A, Sampling Method for Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans Emissions from Stationary Sources, EPA SW-846, as incorporated by reference in s. NR 660.11.

(b) Estimate the 2,3,7,8-TCDD toxicity equivalence of the tetra-octa CDDs/CDFs congeners using “Procedures for Estimating the Toxicity Equivalence of Chlorinated Dibenzo-p-Dioxin and Dibenzofuran Congeners” in Appendix IX. Multiply the emission rates of CDD/CDF congeners with a toxicity equivalence greater than 0 (see the procedure) by the calculated toxicity equivalence factor to estimate the equivalent emission rate of 2,3,7,8-TCDD.

(c) Conduct dispersion modeling using methods recommended in Appendix W of 40 CFR part 51 (“Guideline on Air Quality Models (Revised)” (1986) and its supplements, incorporated by reference in s. NR 660.11), the “Hazardous Waste Combustion Air Quality Screening Procedure”, provided in Appendix IX, or in Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised, EPA-450/R-92-019, incorporated by reference in s. NR 660.11, to predict the maximum annual average

off-site ground level concentration of 2,3,7,8-TCDD equivalents determined under par. (b). The maximum annual average concentration shall be used when a person resides on-site.

(d) The ratio of the predicted maximum annual average ground level concentration of 2,3,7,8-TCDD equivalents to the risk-specific dose for 2,3,7,8-TCDD provided in Appendix V (2.2×10^{-7}) may not exceed 1.0.

(6) MONITORING CO AND HC IN THE BY-PASS DUCT OF A CEMENT KILN. Cement kilns may comply with the carbon monoxide and hydrocarbon limits provided by subs. (2), (3) and (4) by monitoring in the by-pass duct if both of the following conditions are met:

(a) Hazardous waste is fired only into the kiln and not at any location downstream from the kiln exit relative to the direction of gas flow.

(b) The by-pass duct diverts a minimum of 10% of kiln off-gas into the duct.

(7) USE OF EMISSIONS TEST DATA TO DEMONSTRATE COMPLIANCE AND ESTABLISH OPERATING LIMITS. Compliance with this section shall be demonstrated simultaneously by emissions testing or during separate runs under identical operating conditions. Further, data to demonstrate compliance with the CO and HC limits of this section or to establish alternative CO or HC limits under this section shall be obtained during the time that DRE testing, and where applicable, CDD/CDF testing under sub. (5) and comprehensive organic emissions testing under par. (6) is conducted.

(8) ENFORCEMENT. For the purposes of license enforcement, compliance with the operating requirements specified in the license (under s. NR 666.102) shall be regarded as compliance with this section. However, evidence that compliance with those license conditions is insufficient to ensure compliance with this section may be information justifying modification or revocation and re-issuance of a license under s. NR 670.041.

NR 666.105 Standards to control particulate matter. (1) A boiler or industrial furnace burning hazardous waste may not emit particulate matter in excess of 180 milligrams per dry standard cubic meter (0.08 grains per dry standard cubic foot) after correction to a stack gas concentration of 7% oxygen, using procedures prescribed in 40 CFR part 60, appendix A, methods 1 to 5, incorporated by reference in s. NR 660.11, and Appendix IX.

(2) An owner or operator meeting s. NR 666.109(2) for the low risk waste exemption is exempt from the particulate matter standard.

(3) Oxygen correction. (a) Measured pollutant levels shall be corrected for the amount of oxygen in the stack gas according to the formula:

$$P_c = P_m \times 14 / (E - Y)$$

where:

P_c is the corrected concentration of the pollutant in the stack gas, P_m is the measured concentration of the pollutant in the stack gas, E is the oxygen concentration on a dry basis in the combustion air fed to the device, and Y is the measured oxygen concentration on a dry basis in the stack.

(b) For devices that feed normal combustion air, E will equal 21%. For devices that feed oxygen-enriched air for combustion (that is, air with an oxygen concentration exceeding 21%), the value of E will be the concentration of oxygen in the enriched air.

(c) Compliance with all emission standards provided by this subchapter shall be based on correcting to 7% oxygen using this procedure.

(4) For the purposes of license enforcement, compliance with the operating requirements specified in the license (under s. NR 666.102) shall be regarded as compliance with this section. However, evidence

that compliance with those license conditions is insufficient to ensure compliance with this section may be information justifying modification or revocation and re-issuance of a license under s. NR 670.041.

NR 666.106 Standards to control metals emissions. (1) GENERAL. The owner or operator shall comply with the metals standards provided by subs. (2), (3), (4), (5) or (6) for each metal listed in sub. (2) that is present in the hazardous waste at detectable levels using analytical procedures specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in s. NR 660.11.

(2) TIER I FEED RATE SCREENING LIMITS. Feed rate screening limits for metals are specified in Appendix I as a function of terrain-adjusted effective stack height and terrain and land use in the vicinity of the facility. Criteria for facilities that are not eligible to comply with the screening limits are provided in par. (g).

(a) *Noncarcinogenic metals.* The feed rates of antimony, barium, lead, mercury, thallium and silver in all feed streams, including hazardous waste, fuels, and industrial furnace feed stocks may not exceed the screening limits specified in Appendix I.

1. The feed rate screening limits for antimony, barium, mercury, thallium and silver are based on either of the following:

- a. An hourly rolling average as defined in s. NR 666.102(5)(f)1.b.
- b. An instantaneous limit not to be exceeded at any time.

2. The feed rate screening limit for lead is based on one of the following:

- a. An hourly rolling average as defined in s. NR 666.102(5)(f)1.b.
- b. An averaging period of 2 to 24 hours as defined in s. NR 666.102(5)(f)2. with an instantaneous feed rate limit not to exceed 10 times the feed rate that would be allowed on an hourly rolling average basis.

- c. An instantaneous limit not to be exceeded at any time.

(b) *Carcinogenic metals.* 1. The feed rates of arsenic, cadmium, beryllium and chromium in all feed streams, including hazardous waste, fuels, and industrial furnace feed stocks may not exceed values derived from the screening limits specified in Appendix I. The feed rate of each of these metals is limited to a level such that the sum of the ratios of the actual feed rate to the feed rate screening limit specified in Appendix I may not exceed 1.0, as provided by the following equation:

$$\sum_{i=1}^n \frac{AFR_{(i)}}{FRSL_{(i)}} \leq 1.0$$

where:

n=number of carcinogenic metals

AFR=actual feed rate to the device for metal "i"

FRSL=feed rate screening limit provided by Appendix I for metal "i"

2. The feed rate screening limits for the carcinogenic metals are based on either of the following:

- a. An hourly rolling average.
- b. An averaging period of 2 to 24 hours as defined in s. NR 666.102(5)(f)2. with an instantaneous feed rate limit not to exceed 10 times the feed rate that would be allowed on an hourly rolling average basis.

(c) *TESH.* 1. The terrain-adjusted effective stack height is determined according to the following equation:

$$TESH = H_a + H_1 - Tr$$

where:

Ha=Actual physical stack height

H1=Plume rise as determined from Appendix VI as a function of stack flow rate and stack gas exhaust temperature

Tr=Terrain rise within 5 kilometers of the stack

2. The stack height (Ha) may not exceed good engineering practice as specified in 40 CFR 51.100(ii).

3. If the TESH for a particular facility is not listed in the table in the appendices, the nearest lower TESH listed in the table shall be used. If the TESH is 4 meters or less, a value of 4 meters shall be used.

(d) *Terrain type*. The screening limits are a function of whether the facility is located in noncomplex or complex terrain. A device located where any part of the surrounding terrain within 5 kilometers of the stack equals or exceeds the elevation of the physical stack height (Ha) is considered to be in complex terrain and the screening limits for complex terrain apply. Terrain measurements are to be made from U.S. geological survey 7.5-minute topographic maps of the area surrounding the facility.

(e) *Land use*. The screening limits are a function of whether the facility is located in an area where the land use is urban or rural. To determine whether land use in the vicinity of the facility is urban or rural, procedures provided in Appendices IX or X shall be used.

(f) *Multiple stacks*. Owners and operators of facilities with more than one on-site stack from a boiler, industrial furnace, incinerator or other thermal treatment unit subject to controls of metals emissions under an operating license or interim license shall comply with the screening limits for all such units assuming all hazardous waste is fed into the device with the worst-case stack based on dispersion characteristics. The worst-case stack is determined from the following equation as applied to each stack:

$$K=HVT$$

where:

K=a parameter accounting for relative influence of stack height and plume rise

H=physical stack height (meters)

V=stack gas flow rate (m³/second)

T=exhaust temperature (°K)

The stack with the lowest value of K is the worst-case stack.

(g) *Criteria for facilities not eligible for screening limits*. If any of the following criteria are met, the Tier I and Tier II screening limits do not apply. Owners and operators of such facilities shall comply with either the Tier III standards provided by sub. (4) or with the adjusted Tier I feed rate screening limits provided by sub. (5).

1. The device is located in a narrow valley less than one kilometer wide.

2. The device has a stack taller than 20 meters and is located such that the terrain rises to the physical height within one kilometer of the facility.

3. The device has a stack taller than 20 meters and is located within 5 kilometers of a shoreline of a large body of water such as an ocean or large lake.

4. The physical stack height of any stack is less than 2.5 times the height of any building within 5 building heights or 5 projected building widths of the stack and the distance from the stack to the closest boundary is within 5 building heights or 5 projected building widths of the associated building.

5. The department determines that standards based on site-specific dispersion modeling are required.

(h) *Implementation*. The feed rate of metals in each feedstream shall be monitored to ensure that the feed rate screening limits are not exceeded.

(3) TIER II EMISSION RATE SCREENING LIMITS. Emission rate screening limits are specified in Appendix I as a function of terrain-adjusted effective stack height and terrain and land use in the vicinity

of the facility. Criteria for facilities that are not eligible to comply with the screening limits are provided in sub. (2)(g).

(a) *Noncarcinogenic metals.* The emission rates of antimony, barium, lead, mercury, thallium and silver may not exceed the screening limits specified in Appendix I.

(b) *Carcinogenic metals.* The emission rates of arsenic, cadmium, beryllium and chromium may not exceed values derived from the screening limits specified in Appendix I. The emission rate of each of these metals is limited to a level such that the sum of the ratios of the actual emission rate to the emission rate screening limit specified in Appendix I may not exceed 1.0, as provided by the following equation:

$$\sum_{i=1}^n \frac{AER_{(i)}}{ERSL_{(i)}} \leq 1.0$$

where:

n=number of carcinogenic metals

AER=actual emission rate for metal "i"

ERSL=emission rate screening limit provided by Appendix I for metal "i"

(c) *Implementation.* The emission rate limits shall be implemented by limiting feed rates of the individual metals to levels during the trial burn (for new facilities or an interim license facility applying for a license) or the compliance test (for interim license facilities). The feed rate averaging periods are the same as provided by sub. (2)(a)1. and 2. and (b)2. The feed rate of metals in each feedstream shall be monitored to ensure that the feed rate limits for the feedstreams specified under s. NR 666.102 or 666.103 are not exceeded.

(d) *Definitions and limitations.* The definitions and limitations provided by sub. (2) for the following terms also apply to the Tier II emission rate screening limits provided by this subsection: terrain-adjusted effective stack height, good engineering practice stack height, terrain type, land use and criteria for facilities not eligible to use the screening limits.

(e) *Multiple stacks.* 1. Owners and operators of facilities with more than one onsite stack from a boiler, industrial furnace, incinerator or other thermal treatment unit subject to controls on metals emissions under an operating license or interim license shall comply with the emissions screening limits for any such stacks assuming all hazardous waste is fed into the device with the worst-case stack based on dispersion characteristics.

2. The worst-case stack is determined by procedures provided in sub. (2)(f).

3. For each metal, the total emissions of the metal from those stacks may not exceed the screening limit for the worst-case stack.

(4) TIER III AND ADJUSTED TIER I SITE-SPECIFIC RISK ASSESSMENT. The requirements of this subsection apply to facilities complying with either the Tier III or adjusted Tier I controls, except where specified otherwise.

(a) *General.* Conformance with the Tier III metals controls shall be demonstrated by emissions testing to determine the emission rate for each metal. In addition, conformance with either the Tier III or adjusted Tier I metals controls shall be demonstrated by air dispersion modeling to predict the maximum annual average off-site ground level concentration for each dispersion modeling to predict the maximum annual average off-site ground level concentration for each metal, and a demonstration that acceptable ambient levels are not exceeded.

(b) *Acceptable ambient levels.* Appendices IV and V list the acceptable ambient levels for purposes of this rule. Reference air concentrations (RACs) are listed for the noncarcinogenic metals and 10^{-5} risk-specific doses (RSDs) are listed for the carcinogenic metals. The RSD for a metal is the acceptable ambient level for that metal if only one of the 4 carcinogenic metals is emitted. If more than one

carcinogenic metal is emitted, the acceptable ambient level for the carcinogenic metals is a fraction of the RSD as described in par. (c).

(c) *Carcinogenic metals*. For the carcinogenic metals, arsenic, cadmium, beryllium and chromium, the sum of the ratios of the predicted maximum annual average off-site ground level concentrations (except that on-site concentrations shall be considered if a person resides on site) to the risk-specific dose (RSD) for all carcinogenic metals emitted may not exceed 1.0 as determined by the following equation:

$$\sum_{i=1}^n \frac{\text{Predicted Ambient Concentration}_{(i)}}{\text{Risk - Specific Dose}_{(i)}} \leq 1.0$$

where:

n=number of carcinogenic metals

(d) *Noncarcinogenic metals*. For the noncarcinogenic metals, the predicted maximum annual average off-site ground level concentration for each metal may not exceed the reference air concentration (RAC).

(e) *Multiple stacks*. Owners and operators of facilities with more than one on-site stack from a boiler, industrial furnace, incinerator or other thermal treatment unit subject to controls on metals emissions under an operating license or interim license shall conduct emissions testing (except that facilities complying with adjusted Tier I controls need not conduct emissions testing) and dispersion modeling to demonstrate that the aggregate emissions from all such on-site stacks do not result in an exceedance of the acceptable ambient levels.

(f) *Implementation*. Under Tier III, the metals controls shall be implemented by limiting feed rates of the individual metals to levels during the trial burn (for new facilities or an interim license facility applying for an operating license) or the compliance test (for interim license facilities). The feed rate averaging periods are the same as provided by sub. (2)(a)1. and 2. and (b)2. The feed rate of metals in each feedstream shall be monitored to ensure that the feed rate limits for the feedstreams specified under s. NR 666.102 or 666.103 are not exceeded.

(5) ADJUSTED TIER 1 FEED RATE SCREENING LIMITS. The owner or operator may adjust the feed rate screening limits provided by Appendix I to account for site-specific dispersion modeling. Under this approach, the adjusted feed rate screening limit for a metal is determined by back-calculating from the acceptable ambient level provided by Appendices IV and V using dispersion modeling to determine the maximum allowable emission rate. This emission rate becomes the adjusted Tier I feed rate screening limit. The feed rate screening limits for carcinogenic metals are implemented as prescribed in sub. (2)(b).

(6) ALTERNATIVE IMPLEMENTATION APPROACHES. (a) The department may approve on a case-by-case basis approaches to implement the Tier II or Tier III metals emission limits provided by sub. (3) or (4) alternative to monitoring the feed rate of metals in each feedstream.

(b) The emission limits provided by sub. (4) shall be determined as follows:

1. For each noncarcinogenic metal, by back-calculating from the RAC provided in Appendix IV to determine the allowable emission rate for each metal using the dilution factor for the maximum annual average ground level concentration predicted by dispersion modeling in conformance with sub. (8).

2. For each carcinogenic metal by all of the following:

a. Back-calculating from the RSD provided in Appendix V to determine the allowable emission rate for each metal if that metal were the only carcinogenic metal emitted using the dilution factor for the maximum annual average ground level concentration predicted by dispersion modeling in conformance with sub. (8).

b. If more than one carcinogenic metal is emitted, selecting an emission limit for each carcinogenic metal not to exceed the emission rate determined by subd. 2.a. such that the sum for all carcinogenic

metals of the ratios of the selected emission limit to the emission rate determined by subd. 2.a. does not exceed 1.0.

(7) EMISSION TESTING (a) *General*. Emission testing for metals shall be conducted using Method 0060, Determinations of Metals in Stack Emissions, EPA SW-846, as incorporated by reference in s. NR 660.11 .

(b) *Hexavalent chromium*. Emissions of chromium are assumed to be hexavalent chromium unless the owner or operator conducts emissions testing to determine hexavalent chromium emissions using procedures prescribed in Method 0061, Determination of Hexavalent Chromium Emissions from Stationary Sources, EPA SW-846, as incorporated by reference in s. NR 660.11.

(8) DISPERSION MODELING. Dispersion modeling required under this section shall be conducted according to methods recommended in Appendix W of 40 CFR part 51 ("Guideline on Air Quality Models (Revised)" (1986) and its supplements, incorporated by reference in s. NR 660.11), the "Hazardous Waste Combustion Air Quality Screening Procedure", provided in Appendix IX , or in Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised, EPA-450/R-92-019, incorporated by reference in s. NR 660.11, to predict the maximum annual average off-site ground level concentration. However, on-site concentrations shall be considered when a person resides on-site.

(9) ENFORCEMENT. For the purposes of license enforcement, compliance with the operating requirements specified in the license (under s. NR 666.102) shall be regarded as compliance with this section. However, evidence that compliance with those license conditions is insufficient to ensure compliance with this section may be information justifying modification or revocation and re-issuance of a license under s. NR 670.041.

NR 666.107 Standards to control hydrogen chloride (HCl) and chlorine gas (Cl₂) emissions.

(1) GENERAL. The owner or operator shall comply with the hydrogen chloride (HCl) and chlorine (Cl₂) controls provided by sub. (2), (3) or (5).

(2) SCREENING LIMITS (a) *Tier I feed rate screening limits*. Feed rate screening limits are specified for total chlorine in Appendix II as a function of terrain-adjusted effective stack height and terrain and land use in the vicinity of the facility. The feed rate of total chlorine and chloride, both organic and inorganic, in all feed streams, including hazardous waste, fuels and industrial furnace feed stocks may not exceed the levels specified.

(b) *Tier II emission rate screening limits*. Emission rate screening limits for HCl and Cl₂ are specified in Appendix III as a function of terrain-adjusted effective stack height and terrain and land use in the vicinity of the facility. The stack emission rates of HCl and Cl₂ may not exceed the levels specified.

(c) *Definitions and limitations*. The definitions and limitations provided by s. NR 666.106(2) for the following terms also apply to the screening limits provided by this subsection: terrain-adjusted effective stack height, good engineering practice stack height, terrain type, land use and criteria for facilities not eligible to use the screening limits.

(d) *Multiple stacks*. Owners and operators of facilities with more than one on-site stack from a boiler, industrial furnace, incinerator or other thermal treatment unit subject to controls on HCl or Cl₂ emissions under an operating license or interim license shall comply with the Tier I and Tier II screening limits for those stacks assuming all hazardous waste is fed into the device with the worst-case stack based on dispersion characteristics.

1. The worst-case stack is determined by procedures provided in s. NR 666.106(2)(f).

2. Under Tier I, the total feed rate of chlorine and chloride to all subject devices may not exceed the screening limit for the worst-case stack.

3. Under Tier II, the total emissions of HCl and Cl₂ from all subject stacks may not exceed the screening limit for the worst-case stack.

(3) TIER III SITE-SPECIFIC RISK ASSESSMENTS (a) *General*. Conformance with the Tier III controls shall be demonstrated by emissions testing to determine the emission rate for HCl and Cl₂, air dispersion modeling to predict the maximum annual average off-site ground level concentration for each compound, and a demonstration that acceptable ambient levels are not exceeded.

(b) *Acceptable ambient levels*. Appendix IV lists the reference air concentrations (RACs) for HCl (7 micrograms per cubic meter) and Cl₂ (0.4 micrograms per cubic meter).

(c) *Multiple stacks*. Owners and operators of facilities with more than one on-site stack from a boiler, industrial furnace, incinerator or other thermal treatment unit subject to controls on HCl or Cl₂ emissions under an operating license or interim license shall conduct emissions testing and dispersion modeling to demonstrate that the aggregate emissions from all such on-site stacks do not result in an exceedance of the acceptable ambient levels for HCl and Cl₂.

(4) AVERAGING PERIODS. The HCl and Cl₂ controls are implemented by limiting the feed rate of total chlorine and chloride in all feedstreams, including hazardous waste, fuels and industrial furnace feed stocks. Under Tier I, the feed rate of total chloride and chlorine is limited to the Tier I screening limits. Under Tier II and Tier III, the feed rate of total chloride and chlorine is limited to the feed rates during the trial burn (for new facilities or an interim license facility applying for a license) or the compliance test (for interim license facilities). The feed rate limits are based on either of the following:

(a) An hourly rolling average as defined in s. NR 666.102(5)(f).

(b) An instantaneous basis not to be exceeded at any time.

(5) ADJUSTED TIER I FEED RATE SCREENING LIMITS. The owner or operator may adjust the feed rate screening limit provided by Appendix II to account for site-specific dispersion modeling. Under this approach, the adjusted feed rate screening limit is determined by back-calculating from the acceptable ambient level for Cl₂ provided by Appendix IV using dispersion modeling to determine the maximum allowable emission rate. This emission rate becomes the adjusted Tier I feed rate screening limit.

(6) EMISSIONS TESTING. Emissions testing for HCl and Cl₂ shall be conducted using the procedures described in Methods 0050 or 0051, EPA SW-846, as incorporated by reference in s. NR 660.11.

(7) DISPERSION MODELING. Dispersion modeling shall be conducted according to s. NR 666.106(8).

(8) ENFORCEMENT. For the purposes of license enforcement, compliance with the operating requirements specified in the license (under s. NR 666.102) shall be regarded as compliance with this section. However, evidence that compliance with those license conditions is insufficient to ensure compliance with this section may be information justifying modification or revocation and re-issuance of a license under s. NR 670.041.

NR 666.108 Small quantity on-site burner exemption. (1) EXEMPT QUANTITIES. Owners and operators of facilities that burn hazardous waste in an on-site boiler or industrial furnace are exempt from this subchapter if all of the following conditions are met:

(a) The quantity of hazardous waste burned in a device for a calendar month does not exceed the limits provided in the following table based on the terrain-adjusted effective stack height as defined in s. NR 666.102(2)(c):

EXEMPT QUANTITIES FOR SMALL QUANTITY BURNER EXEMPTION

Terrain-adjusted effective stack height of device (meters)	Allowable hazardous waste burning rate (gallons/ month)	Terrain-adjusted effective stack height of device (meters)	Allowable hazardous waste burning rate (gallons/ month)
0 to 3.9	0	40.0 to 44.9	210
4.0 to 5.9	13	45.0 to 49.9	260
6.0 to 7.9	18	50.0 to 54.9	330
8.0 to 9.9	27	55.0 to 59.9	400
10.0 to 11.9	40	60.0 to 64.9	490
12.0 to 13.9	48	65.0 to 69.9	610
14.0 to 15.9	59	70.0 to 74.9	680
16.0 to 17.9	69	75.0 to 79.9	760
18.0 to 19.9	76	80.0 to 84.9	850
20.0 to 21.9	84	85.0 to 89.9	960
22.0 to 23.9	93	90.0 to 94.9	1,100
24.0 to 25.9	100	95.0 to 99.9	1,200
26.0 to 27.9	110	100.0 to 104.9	1,300
28.0 to 29.9	130	105.0 to 109.9	1,500
30.0 to 34.9	140	110.0 to 114.9	1,700
35.0 to 39.9	170	115.0 or greater	1,900

(b) The maximum hazardous waste firing rate does not exceed at any time one percent of the total fuel requirements for the device (hazardous waste plus other fuel) on a total heat input or mass input basis, whichever results in the lower mass feed rate of hazardous waste.

(c) The hazardous waste has a minimum heating value of 5,000 Btu/lb, as generated.

(d) The hazardous waste fuel does not contain (and is not derived from) EPA hazardous waste numbers F020, F021, F022, F023, F026 or F027.

(2) MIXING WITH NONHAZARDOUS FUELS. If hazardous waste fuel is mixed with a nonhazardous fuel, the quantity of hazardous waste before such mixing is used to comply with sub. (1).

(3) MULTIPLE STACKS. If an owner or operator burns hazardous waste in more than one on-site boiler or industrial furnace exempt under this section, the quantity limits provided by sub. (1)(a) are implemented according to the following equation:

$$\sum_{i=1}^n \frac{\text{Actual Quantity Burned}_{(i)}}{\text{Allowable Quantity Burned}_{(i)}} \leq 1.0$$

where:

n means the number of stacks.

Actual Quantity Burned means the waste quantity burned per month in device "i".

Allowable Quantity Burned means the maximum allowable exempt quantity for stack "i" from the table in sub. (1)(a)

Note: Hazardous wastes that are subject to the special requirements for small quantity generators under s. NR 661.05 may be burned in an off-site device under the exemption provided by this section, but shall be included in the quantity determination for the exemption.

(4) NOTIFICATION REQUIREMENTS. The owner or operator of facilities qualifying for the small quantity burner exemption under this section shall provide a one-time signed, written notice to the department indicating all of the following:

- (a) The combustion unit is operating as a small quantity burner of hazardous waste.
- (b) The owner and operator are in compliance with this section.
- (c) The maximum quantity of hazardous waste that the facility may burn per month as provided by sub. (1)(a).

(5) RECORDKEEPING REQUIREMENTS. The owner or operator shall maintain at the facility for at least 3 years sufficient records documenting compliance with the hazardous waste quantity, firing rate and heating value limits of this section. At a minimum, these records shall indicate the quantity of hazardous waste and other fuel burned in each unit per calendar month, and the heating value of the hazardous waste.

NR 666.109 Low risk waste exemption. (1) WAIVER OF DRE STANDARD. The DRE standard of s. NR 666.104(1) does not apply if the boiler or industrial furnace is operated in conformance with par. (a) and the owner or operator demonstrates by procedures prescribed in par. (b) that the burning will not result in unacceptable adverse health effects.

(a) The device shall be operated with all of the following conditions:

1. A minimum of 50% of fuel fired to the device shall be fossil fuel, fuels derived from fossil fuel, tall oil, or, if approved by the department on a case-by-case basis, other nonhazardous fuel with combustion characteristics comparable to fossil fuel. Such fuels are termed primary fuel for purposes of this section. (Tall oil is a fuel derived from vegetable and rosin fatty acids.) The 50% primary fuel firing rate shall be determined on a total heat or mass input basis, whichever results in the greater mass feed rate of primary fuel fired.

2. Primary fuels and hazardous waste fuels shall have a minimum as-fired heating value of 8,000 Btu/lb.

3. The hazardous waste shall be fired directly into the primary fuel flame zone of the combustion chamber.

4. The device shall operate in conformance with the carbon monoxide controls provided by s. NR 666.104(2)(a). Devices subject to the exemption provided by this section are not eligible for the alternative carbon monoxide controls provided by s. NR 666.104(3).

(b) Procedures to demonstrate that the hazardous waste burning will not pose unacceptable adverse public health effects are all of the following:

1. Identify and quantify those nonmetal compounds listed in ch. NR 661, Appendix VIII that could reasonably be expected to be present in the hazardous waste. The constituents excluded from analysis shall be identified and the basis for their exclusion explained.

2. Calculate reasonable, worst case emission rates for each constituent identified in subd. 1. by assuming the device achieves 99.9% destruction and removal efficiency. That is, assume that 0.1% of the mass weight of each constituent fed to the device is emitted.

3. For each constituent identified in subd. 1., use emissions dispersion modeling to predict the maximum annual average ground level concentration of the constituent.

a. Dispersion modeling shall be conducted using methods specified in s. NR 666.106(8).

b. Owners and operators of facilities with more than one on-site stack from a boiler or industrial furnace that is exempt under this section shall conduct dispersion modeling of emissions from all stacks exempt under this section to predict ambient levels prescribed by this subdivision.

4. Ground level concentrations of constituents predicted under subd. 3. may not exceed all of the following levels:

- a. For the noncarcinogenic compounds listed in Appendix IV, the levels established in Appendix IV.
 - b. For the carcinogenic compounds listed in Appendix V, the sum for all constituents of the ratios of the actual ground level concentration to the level established in Appendix V cannot exceed 1.0.
 - c. For constituents not listed in Appendix IV or V, 0.1 micrograms per cubic meter.
- (2) **WAIVER OF PARTICULAR MATTER STANDARD.** The particulate matter standard of s. NR 666.105 does not apply if both of the following conditions are met:
- (a) The DRE standard is waived under sub. (1).
 - (b) The owner or operator complies with the Tier I or adjusted Tier I metals feed rate screening limits provided by s. NR 666.106(2) or (5).

NR 666.110 Waiver of DRE trial burn for boilers. Boilers that operate under the special requirements of this section, and that do not burn hazardous waste containing (or derived from) EPA hazardous waste numbers F020, F021, F022, F023, F026 or F027, are considered to be in conformance with the DRE standard of s. NR 666.104(1), and a trial burn to demonstrate DRE is waived. When burning hazardous waste, all of the following apply:

- (1) A minimum of 50% of fuel fired to the device shall be fossil fuel, fuels derived from fossil fuel, tall oil, or, if approved by the department on a case-by-case basis, other nonhazardous fuel with combustion characteristics comparable to fossil fuel. Such fuels are termed primary fuel for purposes of this section. (Tall oil is a fuel derived from vegetable and rosin fatty acids.) The 50% primary fuel firing rate shall be determined on a total heat or mass input basis, whichever results in the greater mass feed rate of primary fuel fired.
- (2) Boiler load may not be less than 40%. Boiler load is the ratio at any time of the total heat input to the maximum design heat input.
- (3) Primary fuels and hazardous waste fuels shall have a minimum as-fired heating value of 8,000 Btu/lb, and each material fired in a burner where hazardous waste is fired shall have a heating value of at least 8,000 Btu/lb, as-fired.
- (4) The device shall operate in conformance with the carbon monoxide standard provided by s. NR 666.104(2)(a). Boilers subject to the waiver of the DRE trial burn provided by this section are not eligible for the alternative carbon monoxide standard provided by s. NR 666.104(3).
- (5) The boiler shall be a watertube type boiler that does not feed fuel using a stoker or stoker type mechanism.
- (6) The hazardous waste shall be fired directly into the primary fuel flame zone of the combustion chamber with an air or steam atomization firing system, mechanical atomization system, or a rotary cup atomization system under any of the following conditions:
 - (a) *Viscosity.* The viscosity of the hazardous waste fuel as-fired may not exceed 300 SSU.
 - (b) *Particle size.* When a high pressure air or steam atomizer, low pressure atomizer or mechanical atomizer is used, 70% of the hazardous waste fuel shall pass through a 200 mesh (74 micron) screen, and when a rotary cup atomizer is used, 70% of the hazardous waste shall pass through a 100 mesh (150 micron) screen.
 - (c) *Mechanical atomization systems.* Fuel pressure within a mechanical atomization system and fuel flow rate shall be maintained within the design range taking into account the viscosity and volatility of the fuel.
 - (d) *Rotary cup atomization systems.* Fuel flow rate through a rotary cup atomization system shall be maintained within the design range taking into account the viscosity and volatility of the fuel.

NR 666.111 Standards for direct transfer. (1) APPLICABILITY. The regulations in this section apply to owners and operators of boilers and industrial furnaces subject to s. NR 666.102 or 666.103 if

hazardous waste is directly transferred from a transport vehicle to a boiler or industrial furnace without the use of a storage unit.

(2) DEFINITIONS. (a) When used in this section, the following terms have the meanings given in subds. 1. and 2.:

1. *Direct transfer equipment* means any device (including but not limited to, such devices as piping, fittings, flanges, valves and pumps) that is used to distribute, meter or control the flow of hazardous waste between a container (i.e., transport vehicle) and a boiler or industrial furnace.

2. *Container* means any portable device in which hazardous waste is transported, stored, treated or otherwise handled, and includes transport vehicles that are containers themselves (e.g., tank trucks, tanker-trailers and rail tank cars), and containers placed on or in a transport vehicle.

(b) This section references several requirements provided in subchs. I and J of chs. NR 664 and 665. For purposes of this section, the term tank systems in those referenced requirements means direct transfer equipment as defined in par. (a).

(3) GENERAL OPERATING REQUIREMENTS. (a) No direct transfer of a pumpable hazardous waste shall be conducted from an open-top container to a boiler or industrial furnace.

(b) Direct transfer equipment used for pumpable hazardous waste shall always be closed, except when necessary to add or remove the waste, and may not be opened, handled or stored in a manner that may cause any rupture or leak.

(c) The direct transfer of hazardous waste to a boiler or industrial furnace shall be conducted so that it does not do any of the following:

1. Generate extreme heat or pressure, fire, explosion or violent reaction.
 2. Produce uncontrolled toxic mists, fumes, dusts or gases in sufficient quantities to threaten human health.
 3. Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions.
 4. Damage the structural integrity of the container or direct transfer equipment containing the waste.
 5. Adversely affect the capability of the boiler or industrial furnace to meet the standards provided by ss. NR 666.104 to 666.107.
 6. Threaten human health or the environment.
- (d) Hazardous waste may not be placed in direct transfer equipment, if it could cause the equipment or its secondary containment system to rupture, leak, corrode or otherwise fail.

(e) The owner or operator of the facility shall use appropriate controls and practices to prevent spills and overflows from the direct transfer equipment or its secondary containment systems. These include, at a minimum, all of the following:

1. Spill prevention controls (e.g., check valves, dry discount couplings).
2. Automatic waste feed cutoff to use if a leak or spill occurs from the direct transfer equipment.

(4) AREAS WHERE DIRECT TRANSFER VEHICLES (CONTAINERS) ARE LOCATED. Applying the definition of container under this section, owners and operators shall comply with all of the following requirements:

(a) The containment requirements of s. NR 664.0175.

(b) The use and management requirements of subch. I of ch. NR 665, except for ss. NR 665.0170 and 665.0174, and except that in lieu of the special requirements of s. NR 665.0176 for ignitable or reactive waste, the owner or operator may comply with the requirements for the maintenance of protective distances between the waste management area and any public ways, streets, alleys, or an adjacent property line that can be built upon as required in Tables 2-1 to 2-6 of the National Fire Protection Association's (NFPA) "Flammable and Combustible Liquids Code," (1977 or 1981), incorporated by reference in s. NR 660.11. The owner or operator shall obtain and keep on file at the facility a written certification by the local fire marshal that the installation meets the subject NFPA codes.

(c) The closure requirements of s. NR 664.0178.

(5) **DIRECT TRANSFER EQUIPMENT.** Direct transfer equipment shall meet all of the following requirements:

(a) *Secondary containment.* Owners and operators shall comply with the secondary containment requirements of s. NR 665.0193, except for s. NR 665.0193(1), (4), (5) and (9) as follows:

1. For all new direct transfer equipment, prior to their being put into service.
2. For existing direct transfer equipment within 2 years after August 21, 1991.

(b) *Requirements prior to meeting secondary containment requirements.* 1. For existing direct transfer equipment that does not have secondary containment, the owner or operator shall determine whether the equipment is leaking or is unfit for use. The owner or operator shall obtain and keep on file at the facility a written assessment reviewed and certified by a qualified, registered professional engineer in accordance with s. NR 670.011 that attests to the equipment's integrity by August 21, 1992.

2. This assessment shall determine whether the direct transfer equipment is adequately designed and has sufficient structural strength and compatibility with the wastes to be transferred to ensure that it will not collapse, rupture or fail. At a minimum, this assessment shall consider all of the following:

- a. Design standards, if available, according to which the direct transfer equipment was constructed.
- b. Hazardous characteristics of the wastes that have been or will be handled.
- c. Existing corrosion protection measures.
- d. Documented age of the equipment, if available (otherwise, an estimate of the age).
- e. Results of a leak test or other integrity examination such that the effects of temperature variations, vapor pockets, cracks, leaks, corrosion and erosion are accounted for.

3. If, as a result of the assessment specified above, the direct transfer equipment is found to be leaking or unfit for use, the owner or operator shall comply with s. NR 665.0196(1) and (2).

(c) *Inspections and recordkeeping.* 1. The owner or operator shall inspect at least once each operating hour when hazardous waste is being transferred from the transport vehicle (container) to the boiler or industrial furnace all of the following:

- a. Overfill or spill control equipment (e.g., waste-feed cutoff systems, bypass systems and drainage systems) to ensure that it is in good working order.
- b. The above ground portions of the direct transfer equipment to detect corrosion, erosion or releases of waste (e.g., wet spots, dead vegetation).
- c. Data gathered from monitoring equipment and leak-detection equipment, (e.g., pressure and temperature gauges) to ensure that the direct transfer equipment is being operated according to its design.

2. The owner or operator shall inspect cathodic protection systems, if used, to ensure that they are functioning properly according to the schedule provided by s. NR 665.0195(2).

3. Records of inspections made under this paragraph shall be maintained in the operating record at the facility, and available for inspection for at least 3 years from the date of the inspection.

(d) *Design and installation of new ancillary equipment.* Owners and operators shall comply with s. NR 665.0192.

(e) *Response to leaks or spills.* Owners and operators shall comply with s. NR 665.0196.

(f) *Closure.* Owners and operators shall comply with s. NR 665.0197, except for s. NR 665.0197(3)(b) to (d).

NR 666.112 Regulation of residues. A residue derived from the burning or processing of hazardous waste in a boiler or industrial furnace is not excluded from the definition of a hazardous waste under s. NR 661.04(2)(d), (g) or (h) unless the device and the owner or operator meet all of the following requirements:

- (1) The device meets the following criteria:

(a) *Boilers.* Boilers shall burn at least 50% coal on a total heat input or mass input basis, whichever results in the greater mass feed rate of coal.

(b) *Ore or mineral furnaces.* Industrial furnaces subject to s. NR 661.04(2)(g) shall process at least 50% by weight normal, nonhazardous raw materials.

(c) *Cement kilns.* Cement kilns shall process at least 50% by weight normal cement-production raw materials.

(2) The owner or operator demonstrates that the hazardous waste does not significantly affect the residue by demonstrating conformance with either of the following criteria:

(a) *Comparison of waste-derived residue with normal residue.* The waste-derived residue may not contain ch. NR 661, Appendix VIII constituents (toxic constituents) that could reasonably be attributable to the hazardous waste at concentrations significantly higher than in residue generated without burning or processing of hazardous waste, using the following procedure. Toxic compounds that could reasonably be attributable to burning or processing the hazardous waste (constituents of concern) include toxic constituents in the hazardous waste, and the organic compounds listed in Appendix VIII that may be generated as products of incomplete combustion. Sampling and analyses shall be in conformance with procedures prescribed in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA SW-846, incorporated by reference in s. NR 660.11(1). For polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-furans, analyses shall be performed to determine specific congeners and homologues, and the results converted to 2,3,7,8-TCDD equivalent values using the procedure specified in section 4.0 of Appendix IX .

1. 'Normal residue.' Concentrations of toxic constituents of concern in normal residue shall be determined based on analyses of a minimum of 10 samples representing a minimum of 10 days of operation. Composite samples may be used to develop a sample for analysis if the compositing period does not exceed 24 hours. The upper tolerance limit (at 95% confidence with a 95% proportion of the sample distribution) of the concentration in the normal residue shall be considered the statistically-derived concentration in the normal residue. If changes in raw materials or fuels reduce the statistically-derived concentrations of the toxic constituents of concern in the normal residue, the statistically-derived concentrations shall be revised or statistically-derived concentrations of toxic constituents in normal residue shall be established for a new mode of operation with the new raw material or fuel. To determine the upper tolerance limit in the normal residue, the owner or operator shall use statistical procedures prescribed in "Statistical Methodology for Beville Residue Determinations" in Appendix IX.

2. 'Waste-derived residue.' Waste-derived residue shall be sampled and analyzed as often as necessary to determine whether the residue generated during each 24-hour period has concentrations of toxic constituents that are higher than the concentrations established for the normal residue under subd. 1. If so, hazardous waste burning has significantly affected the residue and the residue may not be excluded from the definition of a hazardous waste. Concentrations of toxic constituents of concern in the waste-derived residue shall be determined based on analysis of one or more samples obtained over a 24-hour period. Multiple samples may be analyzed, and multiple samples may be taken to form a composite sample for analysis if the sampling period does not exceed 24 hours. If more than one sample is analyzed to characterize waste-derived residues generated over a 24-hour period, the concentration of each toxic constituent shall be the arithmetic mean of the concentrations in the samples. No results may be disregarded.

(b) *Comparison of waste-derived residue concentrations with health-based limits* 1. 'Nonmetal constituents.' The concentration of each nonmetal toxic constituent of concern (specified in par. (a)) in the waste-derived residue may not exceed the health-based level specified in Appendix VII, or the level of detection (using analytical procedures prescribed in SW-846), whichever is higher. If a health-based limit for a constituent of concern is not listed in Appendix VII, then a limit of 0.002 micrograms per kilogram or the level of detection (using analytical procedures contained in SW-846, or other appropriate methods),

whichever is higher, shall be used. The levels specified in Appendix VII (and the default level of 0.002 micrograms per kilogram or the level of detection for constituents as identified in Note 1 of Appendix VII) are administratively stayed under the condition, for those constituents specified in par. (a), that the owner or operator complies with alternative levels defined as the land disposal restriction limits specified in s. NR 668.43 for F039 nonwastewaters. In complying with those alternative levels, if an owner or operator is unable to detect a constituent despite documenting use of best good-faith efforts as defined by applicable department guidance or standards, the owner or operator is deemed to be in compliance for that constituent. Until new guidance or standards are developed, the owner or operator may demonstrate such good faith efforts by achieving a detection limit for the constituent that does not exceed an order of magnitude above the level provided by s. NR 668.43 for F039 nonwastewaters. In complying with the s. NR 668.43 F039 nonwastewater levels for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-furans, analyses shall be performed for total hexachlorodibenzo-p-dioxins, total hexachlorodibenzofurans, total pentachlorodibenzo-p-dioxins, total pentachlorodibenzofurans, total tetrachlorodibenzo-p-dioxins and total tetrachlorodibenzofurans.

Note: The administrative stay, under the condition that the owner or operator complies with alternative levels defined as the land disposal restriction limits specified in s. NR 668.43 for F039 nonwastewaters, remains in effect until further administrative action is taken and notice is published in the federal register and the Code of Federal Regulations.

2. ‘Metal constituents.’ The concentration of metals in an extract obtained using the toxicity characteristic leaching procedure of s. NR 661.24 may not exceed the levels specified in Appendix VII.

3. ‘Sampling and analysis.’ Waste-derived residue shall be sampled and analyzed as often as necessary to determine whether the residue generated during each 24-hour period has concentrations of toxic constituents that are higher than the health-based levels. Concentrations of toxic constituents of concern in the waste-derived residue shall be determined based on analysis of one or more samples obtained over a 24-hour period. Multiple samples may be analyzed, and multiple samples may be taken to form a composite sample for analysis if the sampling period does not exceed 24 hours. If more than one sample is analyzed to characterize waste-derived residues generated over a 24-hour period, the concentration of each toxic constituent shall be the arithmetic mean of the concentrations in the samples. No results may be disregarded.

(3) Records sufficient to document compliance with this section shall be retained until closure of the boiler or industrial furnace unit. At a minimum, all of the following shall be recorded:

(a) Levels of constituents in ch. NR 661, Appendix VIII that are present in waste-derived residues.

(b) If the waste-derived residue is compared with normal residue under sub. (2)(a), both of the following:

1. The levels of constituents in ch. NR 661, Appendix VIII that are present in normal residues.

2. Data and information, including analyses of samples as necessary, obtained to determine if changes in raw materials or fuels would reduce the concentration of toxic constituents of concern in the normal residue.

Chapter NR 666

APPENDIX I

TIER I AND TIER II FEED RATE AND EMISSIONS SCREENING LIMITS FOR METALS

Table I-A

Tier I and Tier II Feed Rate and Emissions Screening Limits for Noncarcinogenic Metals for Facilities in Noncomplex Terrain

[Values for urban areas]

Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
4	6.0E+01	1.0E+04	1.8E+01	6.0E+01	6.0E+02	6.0E+01
6	6.8E+01	1.1E+04	2.0E+01	6.8E+01	6.8E+02	6.8E+01
8	7.6E+01	1.3E+04	2.3E+01	7.6E+01	7.6E+02	7.6E+01
10	8.6E+01	1.4E+04	2.6E+01	8.6E+01	8.6E+02	8.6E+01
12	9.6E+01	1.7E+04	3.0E+01	9.6E+01	9.6E+02	9.6E+01
14	1.1E+02	1.8E+04	3.4E+01	1.1E+02	1.1E+03	1.1E+02
16	1.3E+02	2.1E+04	3.6E+01	1.3E+02	1.3E+03	1.3E+02
18	1.4E+02	2.4E+04	4.3E+01	1.4E+02	1.4E+03	1.4E+02
20	1.6E+02	2.7E+04	4.6E+01	1.6E+02	1.6E+03	1.6E+02
22	1.8E+02	3.0E+04	5.4E+01	1.8E+02	1.8E+03	1.8E+02
24	2.0E+02	3.4E+04	6.0E+01	2.0E+02	2.0E+03	2.0E+02
26	2.3E+02	3.9E+04	6.8E+01	2.3E+02	2.3E+03	2.3E+02
28	2.6E+02	4.3E+04	7.8E+01	2.6E+02	2.6E+03	2.6E+02
30	3.0E+02	5.0E+04	9.0E+01	3.0E+02	3.0E+03	3.0E+02
35	4.0E+02	6.6E+04	1.1E+02	4.0E+02	4.0E+03	4.0E+02
40	4.6E+02	7.8E+04	1.4E+02	4.6E+02	4.6E+03	4.6E+02
45	6.0E+02	1.0E+05	1.8E+02	6.0E+02	6.0E+03	6.0E+02
50	7.8E+02	1.3E+05	2.3E+02	7.8E+02	7.8E+03	7.8E+02
55	9.6E+02	1.7E+05	3.0E+02	9.6E+02	9.6E+03	9.6E+02
60	1.2E+03	2.0E+05	3.6E+02	1.2E+03	1.2E+04	1.2E+03
65	1.5E+03	2.5E+05	4.3E+02	1.5E+03	1.5E+04	1.5E+03
70	1.7E+03	2.8E+05	5.0E+02	1.7E+03	1.7E+04	1.7E+03
75	1.9E+03	3.2E+05	5.8E+02	1.9E+03	1.9E+04	1.9E+03
80	2.2E+03	3.6E+05	6.4E+02	2.2E+03	2.2E+04	2.2E+03

Table I-A
Tier I and Tier II Feed Rate and Emissions Screening Limits for Noncarcinogenic Metals for Facilities in Noncomplex Terrain
 [Values for urban areas]

Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
85	2.5E+03	4.0E+05	7.6E+02	2.5E+03	2.5E+04	2.5E+03
90	2.8E+03	4.6E+05	8.2E+02	2.8E+03	2.8E+04	2.8E+03
95	3.2E+03	5.4E+05	9.6E+02	3.2E+03	3.2E+04	3.2E+03
100	3.6E+03	6.0E+05	1.1E+03	3.6E+03	3.6E+04	3.6E+03
105	4.0E+03	6.8E+05	1.2E+03	4.0E+03	4.0E+04	4.0E+03
110	4.6E+03	7.8E+05	1.4E+03	4.6E+03	4.6E+04	4.6E+03
115	5.4E+03	8.6E+05	1.6E+03	5.4E+03	5.4E+04	5.4E+03
120	6.0E+03	1.0E+06	1.8E+03	6.0E+03	6.0E+04	6.0E+03

Table I-B
Tier I and Tier II Feed Rate and Emissions Screening Limits for Noncarcinogenic Metals for Facilities in Noncomplex Terrain
 [Values for rural areas]

Terrain adjusted eff. stack ht.(m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
4	3.1E+01	5.2E+03	9.4E+00	3.1E+01	3.1E+02	3.1E+01
6	3.6E+01	6.0E+03	1.1E+01	3.6E+01	3.6E+02	3.6E+01
8	4.0E+01	6.8E+03	1.2E+01	4.0E+01	4.0E+02	4.0E+01
10	4.6E+01	7.8E+03	1.4E+01	4.6E+01	4.6E+02	4.6E+01
12	5.8E+01	9.6E+03	1.7E+01	5.8E+01	5.8E+02	5.8E+01
14	6.8E+01	1.1E+04	2.1E+01	6.8E+01	6.8E+02	6.8E+01
16	8.6E+01	1.4E+04	2.6E+01	8.6E+01	8.6E+02	8.6E+01
18	1.1E+02	1.8E+04	3.2E+01	1.1E+02	1.1E+03	1.1E+02
20	1.3E+02	2.2E+04	4.0E+01	1.3E+02	1.3E+03	1.3E+02
22	1.7E+02	2.8E+04	5.0E+01	1.7E+02	1.7E+03	1.7E+02
24	2.2E+02	3.6E+04	6.4E+01	2.2E+02	2.2E+03	2.2E+02
26	2.8E+02	4.6E+04	8.2E+01	2.8E+02	2.8E+03	2.8E+02
28	3.5E+02	5.8E+04	1.0E+02	3.5E+02	3.5E+03	3.5E+02

Table I-B
Tier I and Tier II Feed Rate and Emissions Screening Limits for Noncarcinogenic Metals for Facilities in Noncomplex Terrain

Terrain adjusted eff. stack ht.(m)	[Values for rural areas]					
	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
30	4.3E+02	7.6E+04	1.3E+02	4.3E+02	4.3E+03	4.3E+02
35	7.2E+02	1.2E+05	2.1E+02	7.2E+02	7.2E+03	7.2E+02
40	1.1E+03	1.8E+05	3.2E+02	1.1E+03	1.1E+04	1.1E+03
45	1.5E+03	2.5E+05	4.6E+02	1.5E+03	1.5E+04	1.5E+03
50	2.0E+03	3.3E+05	6.0E+02	2.0E+03	2.0E+04	2.0E+03
55	2.6E+03	4.4E+05	7.8E+02	2.6E+03	2.6E+04	2.6E+03
60	3.4E+03	5.8E+05	1.0E+03	3.4E+03	3.4E+04	3.4E+03
65	4.6E+03	7.6E+05	1.4E+03	4.6E+03	4.6E+04	4.6E+03
70	5.4E+03	9.0E+05	1.6E+03	5.4E+03	5.4E+04	5.4E+03
75	6.4E+03	1.1E+06	1.9E+03	6.4E+03	6.4E+04	6.4E+03
80	7.6E+03	1.3E+06	2.3E+03	7.6E+03	7.6E+04	7.6E+03
85	9.4E+03	1.5E+06	2.8E+03	9.4E+03	9.4E+04	9.4E+03
90	1.1E+04	1.8E+06	3.3E+03	1.1E+04	1.1E+05	1.1E+04
95	1.3E+04	2.2E+06	3.9E+03	1.3E+04	1.3E+05	1.3E+04
100	1.5E+04	2.6E+06	4.6E+03	1.5E+04	1.5E+05	1.5E+04
105	1.8E+04	3.0E+06	5.4E+03	1.8E+04	1.8E+05	1.8E+04
110	2.2E+04	3.6E+06	6.6E+03	2.2E+04	2.2E+05	2.2E+04
115	2.6E+04	4.4E+06	7.8E+03	2.6E+04	2.6E+05	2.6E+04
120	3.1E+04	5.0E+06	9.2E+03	3.1E+04	3.1E+05	3.1E+04

Table I-C
Tier I and Tier II Feed Rate and Emissions Screening Limits for Noncarcinogenic Metals for Facilities in Complex Terrain

Values for urban and rural areas						
Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
4	1.4E+01	2.4E+03	4.3E+00	1.4E+01	1.4E+02	1.4E+01
6	2.1E+01	3.5E+03	6.2E+00	2.1E+01	2.1E+02	2.1E+01

Table I-C
Tier I and Tier II Feed Rate and Emissions Screening Limits for Noncarcinogenic Metals for Facilities in Complex Terrain

Values for urban and rural areas						
Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
8	3.0E+01	5.0E+03	9.2E+00	3.0E+01	3.0E+02	3.0E+01
10	4.3E+01	7.6E+03	1.3E+01	4.3E+01	4.3E+02	4.3E+01
12	5.4E+01	9.0E+03	1.7E+01	5.4E+01	5.4E+02	5.4E+01
14	6.8E+01	1.1E+04	2.0E+01	6.8E+01	6.8E+02	6.8E+01
16	7.8E+01	1.3E+04	2.4E+01	7.8E+01	7.8E+02	7.8E+01
18	8.6E+01	1.4E+04	2.6E+01	8.6E+01	8.6E+02	8.6E+01
20	9.6E+01	1.6E+04	2.9E+01	9.6E+01	9.6E+02	9.6E+01
22	1.0E+02	1.8E+04	3.2E+01	1.0E+02	1.0E+03	1.0E+02
24	1.2E+02	1.9E+04	3.5E+01	1.2E+02	1.2E+03	1.2E+02
26	1.3E+02	2.2E+04	3.6E+01	1.3E+02	1.3E+03	1.3E+02
28	1.4E+02	2.4E+04	4.3E+01	1.4E+02	1.4E+03	1.4E+02
30	1.6E+02	2.7E+04	4.6E+01	1.6E+02	1.6E+03	1.6E+02
35	2.0E+02	3.3E+04	5.8E+01	2.0E+02	2.0E+03	2.0E+02
40	2.4E+02	4.0E+04	7.2E+01	2.4E+02	2.4E+03	2.4E+02
45	3.0E+02	5.0E+04	9.0E+01	3.0E+02	3.0E+03	3.0E+02
50	3.6E+02	6.0E+04	1.1E+02	3.6E+02	3.6E+03	3.6E+02
55	4.6E+02	7.6E+04	1.4E+02	4.6E+02	4.6E+03	4.6E+02
60	5.8E+02	9.4E+04	1.7E+02	5.8E+02	5.8E+03	5.8E+02
65	6.8E+02	1.1E+05	2.1E+02	6.8E+02	6.8E+03	6.8E+02
70	7.8E+02	1.3E+05	2.4E+02	7.8E+02	7.8E+03	7.8E+02
75	8.6E+02	1.4E+05	2.6E+02	8.6E+02	8.6E+03	8.6E+02
80	9.6E+02	1.6E+05	2.9E+02	9.6E+02	9.6E+03	9.6E+02
85	1.1E+03	1.8E+05	3.3E+02	1.1E+03	1.1E+04	1.1E+03
90	1.2E+03	2.0E+05	3.6E+02	1.2E+03	1.2E+04	1.2E+03
95	1.4E+03	2.3E+05	4.0E+02	1.4E+03	1.4E+04	1.4E+03
100	1.5E+03	2.6E+05	4.6E+02	1.5E+03	1.5E+04	1.5E+03
105	1.7E+03	2.8E+05	5.0E+02	1.7E+03	1.7E+04	1.7E+03
110	1.9E+03	3.2E+05	5.8E+02	1.9E+03	1.9E+04	1.9E+03

Table I-C
Tier I and Tier II Feed Rate and Emissions Screening Limits for Noncarcinogenic Metals for Facilities in Complex Terrain

Values for urban and rural areas						
Terrain adjusted eff. stack ht. (m)	Antimony (g/hr)	Barium (g/hr)	Lead (g/hr)	Mercury (g/hr)	Silver (g/hr)	Thallium (g/hr)
115	2.1E+03	3.6E+05	6.4E+02	2.1E+03	2.1E+04	2.1E+03
120	2.4E+03	4.0E+05	7.2E+02	2.4E+03	2.4E+04	2.4E+03

Table I-D
Tier I and Tier II Feed Rate and Emissions Screening Limits for Carcinogenic Metals for Facilities in Noncomplex Terrain

Values for use in urban areas					Values for use in rural areas			
Terrain adjusted eff. stack ht. (m)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)
4	4.6E-01	1.1E+00	1.7E-01	8.2E-01	2.4E-01	5.8E-01	8.6E-02	4.3E-01
6	5.4E-01	1.3E+00	1.9E-01	9.4E-01	2.8E-01	6.6E-01	1.0E-01	5.0E-01
8	6.0E-01	1.4E+00	2.2E-01	1.1E+00	3.2E-01	7.6E-01	1.1E-01	5.6E-01
10	6.8E-01	1.6E+00	2.4E-01	1.2E+00	3.6E-01	8.6E-01	1.3E-01	6.4E-01
12	7.6E-01	1.8E+00	2.7E-01	1.4E+00	4.3E-01	1.1E+00	1.6E-01	7.8E-01
14	8.6E-01	2.1E+00	3.1E-01	1.5E+00	5.4E-01	1.3E+00	2.0E-01	9.6E-01
16	9.6E-01	2.3E+00	3.5E-01	1.7E+00	6.8E-01	1.6E+00	2.4E-01	1.2E+00
18	1.1E+00	2.6E+00	4.0E-01	2.0E+00	8.2E-01	2.0E+00	3.0E-01	1.5E+00
20	1.2E+00	3.0E+00	4.4E-01	2.2E+00	1.0E+00	2.5E+00	3.7E-01	1.9E+00
22	1.4E+00	3.4E+00	5.0E-01	2.5E+00	1.3E+00	3.2E+00	4.8E-01	2.4E+00
24	1.6E+00	3.9E+00	5.8E-01	2.8E+00	1.7E+00	4.0E+00	6.0E-01	3.0E+00
26	1.8E+00	4.3E+00	6.4E-01	3.2E+00	2.1E+00	5.0E+00	7.6E-01	3.9E+00
28	2.0E+00	4.8E+00	7.2E-01	3.6E+00	2.7E+00	6.4E+00	9.8E-01	5.0E+00
30	2.3E+00	5.4E+00	8.2E-01	4.0E+00	3.5E+00	8.2E+00	1.2E+00	6.2E+00
35	3.0E+00	6.8E+00	1.0E+00	5.4E+00	5.4E+00	1.3E+01	1.9E+00	9.6E+00
40	3.6E+00	9.0E+00	1.3E+00	6.8E+00	8.2E+00	2.0E+01	3.0E+00	1.5E+01
45	4.6E+00	1.1E+01	1.7E+00	8.6E+00	1.1E+01	2.8E+01	4.2E+00	2.1E+01
50	6.0E+00	1.4E+01	2.2E+00	1.1E+01	1.5E+01	3.7E+01	5.4E+00	2.8E+01

Table I-D
Tier I and Tier II Feed Rate and Emissions Screening Limits for Carcinogenic Metals for Facilities in Noncomplex Terrain

Terrain adjusted eff. stack ht. (m)	Values for use in urban areas				Values for use in rural areas			
	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)
55	7.6E+00	1.8E+01	2.7E+00	1.4E+01	2.0E+01	5.0E+01	7.2E+00	3.6E+01
60	9.4E+00	2.2E+01	3.4E+00	1.7E+01	2.7E+01	6.4E+01	9.6E+00	4.8E+01
65	1.1E+01	2.8E+01	4.2E+00	2.1E+01	3.6E+01	8.6E+01	1.3E+01	6.4E+01
70	1.3E+01	3.1E+01	4.6E+00	2.4E+01	4.3E+01	1.0E+02	1.5E+01	7.6E+01
75	1.5E+01	3.6E+01	5.4E+00	2.7E+01	5.0E+01	1.2E+02	1.8E+01	9.0E+01
80	1.7E+01	4.0E+01	6.0E+00	3.0E+01	6.0E+01	1.4E+02	2.2E+01	1.1E+02
85	1.9E+01	4.6E+01	6.8E+00	3.4E+01	7.2E+01	1.7E+02	2.6E+01	1.3E+02
90	2.2E+01	5.0E+01	7.8E+00	3.9E+01	8.6E+01	2.0E+02	3.0E+01	1.5E+02
95	2.5E+01	5.8E+01	9.0E+00	4.4E+01	1.0E+02	2.4E+02	3.6E+01	1.8E+02
100	2.8E+01	6.8E+01	1.0E+01	5.0E+01	1.2E+02	2.9E+02	4.3E+01	2.2E+02
105	3.2E+01	7.6E+01	1.1E+01	5.6E+01	1.4E+02	3.4E+02	5.0E+01	2.6E+02
110	3.6E+01	8.6E+01	1.3E+01	6.4E+01	1.7E+02	4.0E+02	6.0E+01	3.0E+02
115	4.0E+01	9.6E+01	1.5E+01	7.2E+01	2.0E+02	4.8E+02	7.2E+01	3.6E+02
120	4.6E+01	1.1E+02	1.7E+01	8.2E+01	2.4E+02	5.8E+02	8.6E+01	4.3E+02

Table I-E
Tier I and Tier II Feed Rate and Emissions Screening Limits for Carcinogenic Metals for Facilities in Complex Terrain

Values for use in urban and rural areas				
Terrain adjusted eff. stack ht. (m)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)
4	1.1E-01	2.6E-01	4.0E-02	2.0E-01
6	1.6E-01	3.9E-01	5.8E-02	2.9E-01
8	2.4E-01	5.8E-01	8.6E-02	4.3E-01
10	3.5E-01	8.2E-01	1.3E-01	6.2E-01
12	4.3E-01	1.0E+00	1.5E-01	7.6E-01
14	5.0E-01	1.3E+00	1.9E-01	9.4E-01

Table I-E
Tier I and Tier II Feed Rate and Emissions Screening Limits for Carcinogenic Metals for Facilities in Complex Terrain

Values for use in urban and rural areas				
Terrain adjusted eff. stack ht. (m)	Arsenic (g/hr)	Cadmium (g/hr)	Chromium (g/hr)	Beryllium (g/hr)
16	6.0E-01	1.4E+00	2.2E-01	1.1E+00
18	6.8E-01	1.6E+00	2.4E-01	1.2E+00
20	7.6E-01	1.8E+00	2.7E-01	1.3E+00
22	8.2E-01	1.9E+00	3.0E-01	1.5E+00
24	9.0E-01	2.1E+00	3.3E-01	1.6E+00
26	1.0E+00	2.4E+00	3.6E-01	1.8E+00
28	1.1E+00	2.7E+00	4.0E-01	2.0E+00
30	1.2E+00	3.0E+00	4.4E-01	2.2E+00
35	1.5E+00	3.7E+00	5.4E-01	2.7E+00
40	1.9E+00	4.6E+00	6.8E-01	3.4E+00
45	2.4E+00	5.4E+00	8.4E-01	4.2E+00
50	2.9E+00	6.8E+00	1.0E+00	5.0E+00
55	3.5E+00	8.4E+00	1.3E+00	6.4E+00
60	4.3E+00	1.0E+01	1.5E+00	7.8E+00
65	5.4E+00	1.3E+01	1.9E+00	9.6E+00
70	6.0E+00	1.4E+01	2.2E+00	1.1E+01
75	6.8E+00	1.6E+01	2.4E+00	1.2E+01
80	7.6E+00	1.8E+01	2.7E+00	1.3E+01
85	8.2E+00	2.0E+01	3.0E+00	1.5E+01
90	9.4E+00	2.3E+01	3.4E+00	1.7E+01
95	1.0E+01	2.5E+01	4.0E+00	1.9E+01
100	1.2E+01	2.8E+01	4.3E+00	2.1E+01
105	1.3E+01	3.2E+01	4.8E+00	2.4E+01
110	1.5E+01	3.5E+01	5.4E+00	2.7E+01
115	1.7E+01	4.0E+01	6.0E+00	3.0E+01
120	1.9E+01	4.4E+01	6.4E+00	3.3E+01

Chapter NR 666

APPENDIX II**TIER I FEED RATE SCREENING LIMITS FOR TOTAL CHLORINE**

Terrain-adjusted effective stack height (m)	Noncomplex Terrain		Complex Terrain
	Urban (g/hr)	Rural (g/hr)	(g/hr)
4	8.2E+01	4.2E+01	1.9E+01
6	9.1E+01	4.8E+01	2.8E+01
8	1.0E+02	5.3E+01	4.1E+01
10	1.2E+02	6.2E+01	5.8E+01
12	1.3E+02	7.7E+01	7.2E+01
14	1.5E+02	9.1E+01	9.1E+01
16	1.7E+02	1.2E+02	1.1E+02
18	1.9E+02	1.4E+02	1.2E+02
20	2.1E+02	1.8E+02	1.3E+02
22	2.4E+02	2.3E+02	1.4E+02
24	2.7E+02	2.9E+02	1.6E+02
26	3.1E+02	3.7E+02	1.7E+02
28	3.5E+02	4.7E+02	1.9E+02
30	3.9E+02	5.8E+02	2.1E+02
35	5.3E+02	9.6E+02	2.6E+02
40	6.2E+02	1.4E+03	3.3E+02
45	8.2E+02	2.0E+03	4.0E+02
50	1.1E+03	2.6E+03	4.8E+02
55	1.3E+03	3.5E+03	6.2E+02
60	1.6E+03	4.6E+03	7.7E+02
65	2.0E+03	6.2E+03	9.1E+02
70	2.3E+03	7.2E+03	1.1E+03
75	2.5E+03	8.6E+03	1.2E+03
80	2.9E+03	1.0E+04	1.3E+03
85	3.3E+03	1.2E+04	1.4E+03
90	3.7E+03	1.4E+04	1.6E+03
95	4.2E+03	1.7E+04	1.8E+03
100	4.8E+03	2.1E+04	2.0E+03
105	5.3E+03	2.4E+04	2.3E+03
110	6.2E+03	2.9E+04	2.5E+03
115	7.2E+03	3.5E+04	2.8E+03
120	8.2E+03	4.1E+04	3.2E+03

Chapter NR 666

APPENDIX III

TIER II EMISSION RATE SCREENING LIMITS FOR FREE CHLORINE AND HYDROGEN CHLORIDE

Terrain-adjusted effective stack height (m)	Noncomplex terrain				Complex terrain	
	Values for urban areas		Values for rural areas		Values for use in urban and rural areas	
	Cl ₂ (g/hr)	HCl (g/hr)	Cl ₂ (g/hr)	HCl (g/hr)	Cl ₂ (g/hr)	HCl (g/hr)
4	8.2E+01	1.4E+03	4.2E+01	7.3E+02	1.9E+01	3.3E+02
6	9.1E+01	1.6E+03	4.8E+01	8.3E+02	2.8E+01	4.9E+02
8	1.0E+02	1.8E+03	5.3E+01	9.2E+02	4.1E+01	7.1E+02
10	1.2E+02	2.0E+03	6.2E+01	1.1E+03	5.8E+01	1.0E+03
12	1.3E+02	2.3E+03	7.7E+01	1.3E+03	7.2E+01	1.3E+03
14	1.5E+02	2.6E+03	9.1E+01	1.6E+03	9.1E+01	1.6E+03
16	1.7E+02	2.9E+03	1.2E+02	2.0E+03	1.1E+02	1.8E+03
18	1.9E+02	3.3E+03	1.4E+02	2.5E+03	1.2E+02	2.0E+03
20	2.1E+02	3.7E+03	1.8E+02	3.1E+03	1.3E+02	2.3E+03
22	2.4E+02	4.2E+03	2.3E+02	3.9E+03	1.4E+02	2.4E+03
24	2.7E+02	4.8E+03	2.9E+02	5.0E+03	1.6E+02	2.8E+03
26	3.1E+02	5.4E+03	3.7E+02	6.5E+03	1.7E+02	3.0E+03
28	3.5E+02	6.0E+03	4.7E+02	8.1E+03	1.9E+02	3.4E+03
30	3.9E+02	6.9E+03	5.8E+02	1.0E+04	2.1E+02	3.7E+03
35	5.3E+02	9.2E+03	9.6E+02	1.7E+04	2.6E+02	4.6E+03
40	6.2E+02	1.1E+04	1.4E+03	2.5E+04	3.3E+02	5.7E+03
45	8.2E+02	1.4E+04	2.0E+03	3.5E+04	4.0E+02	7.0E+03
50	1.1E+03	1.8E+04	2.6E+03	4.6E+04	4.8E+02	8.4E+03
55	1.3E+03	2.3E+04	3.5E+03	6.1E+04	6.2E+02	1.1E+04
60	1.6E+03	2.9E+04	4.6E+03	8.1E+04	7.7E+02	1.3E+04
65	2.0E+03	3.4E+04	6.2E+03	1.1E+05	9.1E+02	1.6E+04
70	2.3E+03	3.9E+04	7.2E+03	1.3E+05	1.1E+03	1.8E+04
75	2.5E+03	4.5E+04	8.6E+03	1.5E+05	1.2E+03	2.0E+04
80	2.9E+03	5.0E+04	1.0E+04	1.8E+05	1.3E+03	2.3E+04
85	3.3E+03	5.8E+04	1.2E+04	2.2E+05	1.4E+03	2.5E+04
90	3.7E+03	6.6E+04	1.4E+04	2.5E+05	1.6E+03	2.9E+04
95	4.2E+03	7.4E+04	1.7E+04	3.0E+05	1.8E+03	3.2E+04
100	4.8E+03	8.4E+04	2.1E+04	3.6E+05	2.0E+03	3.5E+04
105	5.3E+03	9.2E+04	2.4E+04	4.3E+05	2.3E+03	3.9E+04
110	6.2E+03	1.1E+05	2.9E+04	5.1E+05	2.5E+03	4.5E+04
115	7.2E+03	1.3E+05	3.5E+04	6.1E+05	2.8E+03	5.0E+04
120	8.2E+03	1.4E+05	4.1E+04	7.2E+05	3.2E+03	5.6E+04

Chapter NR 666

APPENDIX IV

REFERENCE AIR CONCENTRATIONS*

Constituent	CAS No.	RAC (ug/m ³)
Acetaldehyde	75-07-0	10
Acetonitrile	75-05-8	10
Acetophenone	98-86-2	100
Acrolein	107-02-8	20
Aldicarb	116-06-3	1
Aluminum Phosphide.....	20859-73-8	0.3
Allyl Alcohol	107-18-6	5
Antimony	7440-36-0	0.3
Barium	7440-39-3	50
Barium Cyanide	542-62-1	50
Bromomethane	74-83-9	0.8
Calcium Cyanide	592-01-8	30
Carbon Disulfide	75-15-0	200
Chloral	75-87-6	2
Chlorine (free)		0.4
2-Chloro-1,3-butadiene	126-99-8	3
Chromium III	16065-83-1	1000
Copper Cyanide	544-92-3	5
Cresols	1319-77-3	50
Cumene	98-82-8	1
Cyanide (free)	57-12-15	20
Cyanogen	460-19-5	30
Cyanogen Bromide	506-68-3	80
Di-n-butyl Phthalate	84-74-2	100
o-Dichlorobenzene	95-50-1	10
p-Dichlorobenzene	106-46-7	10
Dichlorodifluoromethane	75-71-8	200
2,4-Dichlorophenol	120-83-2	3
Diethyl Phthalate	84-66-2	800
Dimethoate	60-51-5	0.8
2,4-Dinitrophenol	51-28-5	2
Dinoseb	88-85-7	0.9
Diphenylamine	122-39-4	20
Endosulfan	115-29-1	0.05
Endrin	72-20-8	0.3
Fluorine	7782-41-4	50
Formic Acid	64-18-6	2000
Glycidyaldehyde	765-34-4	0.3
Hexachlorocyclopentadiene	77-47-4	5
Hexachlorophene	70-30-4	0.3
Hydrocyanic Acid	74-90-8	20

Chapter NR 666

APPENDIX IV

REFERENCE AIR CONCENTRATIONS*

Constituent	CAS No.	RAC (ug/m ³)
Hydrogen Chloride	7647-01-1	7
Hydrogen Sulfide	7783-06-4	3
Isobutyl Alcohol	78-83-1	300
Lead	7439-92-1	0.09
Maleic Anyhdride	108-31-6	100
Mercury	7439-97-6	0.3
Methacrylonitrile	126-98-7	0.1
Methomyl	16752-77-5	20
Methoxychlor	72-43-5	50
Methyl Chlorocarbonate	79-22-1	1000
Methyl Ethyl Ketone	78-93-3	80
Methyl Parathion	298-00-0	0.3
Nickel Cyanide	557-19-7	20
Nitric Oxide	10102-43-9	100
Nitrobenzene	98-95-3	0.8
Pentachlorobenzene	608-93-5	0.8
Pentachlorophenol	87-86-5	30
Phenol	108-95-2	30
M-Phenylenediamine	108-45-2	5
Phenylmercuric Acetate	62-38-4	0.075
Phosphine	7803-51-2	0.3
Phthalic Anhydride	85-44-9	2000
Potassium Cyanide	151-50-8	50
Potassium Silver Cyanide	506-61-6	200
Pyridine	110-86-1	1
Selenious Acid	7783-60-8	3
Selenourea	630-10-4	5
Silver	7440-22-4	3
Silver Cyanide	506-64-9	100
Sodium Cyanide	143-33-9	30
Strychnine	57-24-9	0.3
1,2,4,5-Tetrachlorobenzene.....	95-94-3	0.3
2,3,4,6-Tetrachlorophenol.....	58-90-2	30
Tetraethyl Lead	78-00-2	0.0001
Tetrahydrofuran	109-99-9	10
Thallic Oxide	1314-32-5	0.3
Thallium	7440-28-0	0.5
Thallium (I) Acetate	563-68-8	0.5
Thallium (I) Carbonate.....	6533-73-9	0.3
Thallium (I) Chloride	7791-12-0	0.3
Thallium (I) Nitrate	10102-45-1	0.5
Thallium Selenite	12039-52-0	0.5

Chapter NR 666

APPENDIX IV**REFERENCE AIR CONCENTRATIONS***

Constituent	CAS No.	RAC (ug/m ³)
Thallium (I) Sulfate	7446-18-6	0.075
Thiram	137-26-8	5
Toluene	108-88-3	300
1,2,4-Trichlorobenzene	120-82-1	20
Trichloromonofluoromethane ..	75-69-4	300
2,4,5-Trichlorophenol	95-95-4	100
Vanadium Pentoxide	1314-62-1	20
Warfarin	81-81-2	0.3
Xylenes	1330-20-7	80
Zinc Cyanide	557-21-1	50
Zinc Phosphide	1314-84-7	0.3

*The RAC for other ch. NR 661, Appendix VIII constituents not listed herein or in Appendix V is 0.1 ug/m³.

Chapter NR 666
APPENDIX V
RISK SPECIFIC DOSES (10⁻⁵)

Constituent	CAS No.	Unit risk (m ³ /ug)	RsD (ug/m ³)
Acrylamide	79-06-1	1.3E-03	7.7E-03
Acrylonitrile	107-13-1	6.8E-05	1.5E-01
Aldrin	309-00-2	4.9E-03	2.0E-03
Aniline	62-53-3	7.4E-06	1.4E+00
Arsenic	7440-38-2	4.3E-03	2.3E-03
Benz(a)anthracene	56-55-3	8.9E-04	1.1E-02
Benzene	71-43-2	8.3E-06	1.2E+00
Benzidine	92-87-5	6.7E-02	1.5E-04
Benzo(a)pyrene	50-32-8	3.3E-03	3.0E-03
Beryllium	7440-41-7	2.4E-03	4.2E-03
Bis(2-chloroethyl)ether	111-44-4	3.3E-04	3.0E-02
Bis(chloromethyl)ether	542-88-1	6.2E-02	1.6E-04
Bis(2-ethylhexyl)-phthalate	117-81-7	2.4E-07	4.2E+01
1,3-Butadiene	106-99-0	2.8E-04	3.6E-02
Cadmium	7440-43-9	1.8E-03	5.6E-03
Carbon Tetrachloride	56-23-5	1.5E-05	6.7E-01
Chlordane	57-74-9	3.7E-04	2.7E-02
Chloroform	67-66-3	2.3E-05	4.3E-01
Chloromethane	74-87-3	3.6E-06	2.8E+00
Chromium VI	7440-47-3	1.2E-02	8.3E-04
DDT	50-29-3	9.7E-05	1.0E-01
Dibenz(a,h)anthracene	53-70-3	1.4E-02	7.1E-04
1,2-Dibromo-3-chloropropane	96-12-8	6.3E-03	1.6E-03
1,2-Dibromoethane	106-93-4	2.2E-04	4.5E-02
1,1-Dichloroethane	75-34-3	2.6E-05	3.8E-01
1,2-Dichloroethane	107-06-2	2.6E-05	3.8E-01
1,1-Dichloroethylene	75-35-4	5.0E-05	2.0E-01
1,3-Dichloropropene	542-75-6	3.5E-01	2.9E-05
Dieldrin	60-57-1	4.6E-03	2.2E-03
Diethylstilbestrol	56-53-1	1.4E-01	7.1E-05
Dimethylnitrosamine	62-75-9	1.4E-02	7.1E-04
2,4-Dinitrotoluene	121-14-2	8.8E-05	1.1E-01
1,2-Diphenylhydrazine	122-66-7	2.2E-04	4.5E-02
1,4-Dioxane	123-91-1	1.4E-06	7.1E+00
Epichlorohydrin	106-89-8	1.2E-06	8.3E+00
Ethylene Oxide	75-21-8	1.0E-04	1.0E-01
Ethylene Dibromide	106-93-4	2.2E-04	4.5E-02
Formaldehyde	50-00-0	1.3E-05	7.7E-01
Heptachlor	76-44-8	1.3E-03	7.7E-03
Heptachlor Epoxide	1024-57-3	2.6E-03	3.8E-03
Hexachlorobenzene	118-74-1	4.9E-04	2.0E-02

Chapter NR 666
APPENDIX V
RISK SPECIFIC DOSES (10^{-5})

Constituent	CAS No.	Unit risk (m^3/ug)	RsD (ug/m^3)
Hexachlorobutadiene	87-68-3	2.0E-05	5.0E-01
Alpha-hexachloro-cyclohexane	319-84-6	1.8E-03	5.6E-03
Beta-hexachloro-cyclohexane	319-85-7	5.3E-04	1.9E-02
Gamma-hexachloro-cyclohexane	58-89-9	3.8E-04	2.6E-02
Hexachlorocyclo-hexane, Technical		5.1E-04	2.0E-02
Hexachlorodibenxo-p-dioxin(1,2 Mixture)		1.3E+0	7.7E-06
Hexachloroethane	67-72-1	4.0E-06	2.5E+00
Hydrazine	302-01-2	2.9E-03	3.4E-03
Hydrazine Sulfate	302-01-2	2.9E-03	3.4E-03
3-Methylcholanthrene	56-49-5	2.7E-03	3.7E-03
Methyl Hydrazine	60-34-4	3.1E-04	3.2E-02
Methylene Chloride	75-09-2	4.1E-06	2.4E+00
4,4'-Methylene-bis-2-chloroaniline	101-14-4	4.7E-05	2.1E-01
Nickel	7440-02-0	2.4E-04	4.2E-02
Nickel Refinery Dust	7440-02-0	2.4E-04	4.2E-02
Nickel Subsulfide	12035-72-2	4.8E-04	2.1E-02
2-Nitropropane	79-46-9	2.7E-02	3.7E-04
N-Nitroso-n-butylamine	924-16-3	1.6E-03	6.3E-03
N-Nitroso-n-methylurea	684-93-5	8.6E-02	1.2E-04
N-Nitrosodiethylamine	55-18-5	4.3E-02	2.3E-04
N-Nitrosopyrrolidine	930-55-2	6.1E-04	1.6E-02
Pentachloronitrobenzene	82-68-8	7.3E-05	1.4E-01
PCBs	1336-36-3	1.2E-03	8.3E-03
Pronamide	23950-58-5	4.6E-06	2.2E+00
Reserpine	50-55-5	3.0E-03	3.3E-03
2,3,7,8-Tetrachloro-dibenzo-p-dioxin	1746-01-6	4.5E+01	2.2E-07
1,1,2,2-Tetrachloroethane	79-34-5	5.8E-05	1.7E-01
Tetrachloroethylene	127-18-4	4.8E-07	2.1E+01
Thiourea	62-56-6	5.5E-04	1.8E-02
1,1,2-Trichloroethane	79-00-5	1.6E-05	6.3E-01
Trichloroethylene	79-01-6	1.3E-06	7.7E+00
2,4,6-Trichlorophenol	88-06-2	5.7E-06	1.8E+00
Toxaphene	8001-35-2	3.2E-04	3.1E-02
Vinyl Chloride	75-01-4	7.1E-06	1.4E+00

Chapter NR 666
APPENDIX VI
STACK PLUME RISE

[Estimated Plume Rise (in Meters) Based on Stack Exit Flow Rate and Gas Temperature]

Flow rate (m ³ /s)	Exhaust Temperature (°K)										
	<325	325-349	350-399	400-449	450-499	500-599	600-699	700-799	800-999	1000-1499	>1499
<0.5	0	0	0	0	0	0	0	0	0	0	0
0.5-0.9	0	0	0	0	0	0	0	0	1	1	1
1.0-1.9	0	0	0	0	1	1	2	3	3	3	4
2.0-2.9	0	0	1	3	4	4	6	6	7	8	9
3.0-3.9	0	1	2	5	6	7	9	10	11	12	13
4.0-4.9	1	2	4	6	8	10	12	13	14	15	17
5.0-7.4	2	3	5	8	10	12	14	16	17	19	21
7.5-9.9	3	5	8	12	15	17	20	22	22	23	24
10.0-12.4	4	6	10	15	19	21	23	24	25	26	27
12.5-14.9	4	7	12	18	22	23	25	26	27	28	29
15.0-19.9	5	8	13	20	23	24	26	27	28	29	31
20.0-24.9	6	10	17	23	25	27	29	30	31	32	34
25.0-29.9	7	12	20	25	27	29	31	32	33	35	36
30.0-34.9	8	14	22	26	29	31	33	35	36	37	39
35.0-39.9	9	16	23	28	30	32	35	36	37	39	41
40.0-49.9	10	17	24	29	32	34	36	38	39	41	42
50.0-59.9	12	21	26	31	34	36	39	41	42	44	46
60.0-69.9	14	22	27	33	36	39	42	43	45	47	49
70.0-79.9	16	23	29	35	38	41	44	46	47	49	51
80.0-89.9	17	25	30	36	40	42	46	48	49	51	54
90.0-99.9	19	26	31	38	42	44	48	50	51	53	56
100.0-119.9	21	26	32	39	43	46	49	52	53	55	58
120.0-139.9	22	28	35	42	46	49	52	55	56	59	61
140.0-159.9	23	30	36	44	48	51	55	58	59	62	65
160.0-179.9	25	31	38	46	50	54	58	60	62	65	67
180.0-199.9	26	32	40	48	52	56	60	63	65	67	70
>199.9	26	33	41	49	54	58	62	65	67	69	73

Chapter NR 666

APPENDIX VII

HEALTH-BASED LIMITS FOR EXCLUSION OF WASTE-DERIVED RESIDUES*

Metals—TCLP Extract Concentration Limits

Constituent	CAS No.	Concentration limits (mg/L)
Antimony	7440-36-0	1xE+00
Arsenic	7440-38-2	5xE+00
Barium	7440-39-3	1xE+02
Beryllium	7440-41-7	7xE-03
Cadmium	7440-43-9	1xE+00
Chromium	7440-47-3	5xE+00
Lead	7439-92-1	5xE+00
Mercury	7439-97-6	2xE-01
Nickel	7440-02-0	7xE+01
Selenium	7782-49-2	1xE+00
Silver	7440-22-4	5xE+00
Thallium	7440-28-0	7xE+00

Nonmetals—Residue Concentration Limits

Constituent	CAS No.	Concentration limits for residues (mg/kg)
Acetonitrile	75-05-8	2xE-01
Acetophenone	98-86-2	4xE+00
Acrolein	107-02-8	5xE-01
Acrylamide	79-06-1	2xE-04
Acrylonitrile	107-13-1	7xE-04
Aldrin	309-00-2	2xE-05
Allyl alcohol	107-18-6	2xE-01
Aluminum phosphide	20859-73-8	1xE-02
Aniline	62-53-3	6xE-02
Barium cyanide	542-62-1	1xE+00
Benz(a)anthracene	56-55-3	1xE-04
Benzene	71-43-2	5xE-03
Benzidine	92-87-5	1xE-06
Bis(2-chloroethyl) ether	111-44-4	3xE-04
Bis(chloromethyl) ether	542-88-1	2xE-06
Bis(2-ethylhexyl) phthalate	117-81-7	3xE+01
Bromoform	75-25-2	7xE-01
Calcium cyanide	592-01-8	1xE-06
Carbon disulfide	75-15-0	4xE+00
Carbon tetrachloride	56-23-5	5xE-03
Chlordane	57-74-9	3xE-04
Chlorobenzene	108-90-7	1xE+00
Chloroform	67-66-3	6xE-02
Copper cyanide	544-92-3	2xE-01

Nonmetals—Residue Concentration Limits

Constituent	CAS No.	Concentration limits for residues (mg/kg)
Cresols (Cresylic acid)	1319-77-3	2xE+00
Cyanogen	460-19-5	1xE+00
DDT	50-29-3	1xE-03
Dibenz(a, h)-anthracene	53-70-3	7xE-06
1,2-Dibromo-3-chloropropane	96-12-8	2xE-05
p-Dichlorobenzene	106-46-7	7.5xE-02
Dichlorodifluoromethane	75-71-8	7xE+00
1,1-Dichloroethylene	75-35-4	5xE-03
2,4-Dichlorophenol	120-83-2	1xE-01
1,3-Dichloropropene	542-75-6	1xE-03
Dieldrin	60-57-1	2xE-05
Diethyl phthalate	84-66-2	3xE+01
Diethylstilbesterol	56-53-1	7xE-07
Dimethoate	60-51-5	3xE-02
2,4-Dinitrotoluene	121-14-2	5xE-04
Diphenylamine	122-39-4	9xE-01
1,2-Diphenylhydrazine	122-66-7	5xE-04
Endosulfan	115-29-7	2xE-03
Endrin	72-20-8	2xE-04
Epichlorohydrin	106-89-8	4xE-02
Ethylene dibromide	106-93-4	4xE-07
Ethylene oxide	75-21-8	3xE-04
Fluorine	7782-41-4	4xE+00
Formic acid	64-18-6	7xE+01
Heptachlor	76-44-8	8xE-05
Heptachlor epoxide	1024-57-3	4xE-05
Hexachlorobenzene	118-74-1	2xE-04
Hexachlorobutadiene	87-68-3	5xE-03
Hexachlorocyclopentadiene	77-47-4	2xE-01
Hexachlorodibenzo-p-dioxins	19408-74-3	6xE-08
Hexachloroethane	67-72-1	3xE-02
Hydrazine	302-01-1	1xE-04
Hydrogen cyanide	74-90-8	7xE-05
Hydrogen sulfide	7783-06-4	1xE-06
Isobutyl alcohol	78-83-1	1xE+01
Methomyl	16752-77-5	1xE+00
Methoxychlor	72-43-5	1xE-01
3-Methylcholanthrene	56-49-5	4xE-05
4,4'-Methylenebis (2-chloroaniline)	101-14-4	2xE-03
Methylene chloride	75-09-2	5xE-02
Methyl ethyl ketone (MEK)	78-93-3	2xE+00
Methyl hydrazine	60-34-4	3xE-04
Methyl parathion	298-00-0	2xE-02
Naphthalene	91-20-3	1xE+01

Nonmetals—Residue Concentration Limits

Constituent	CAS No.	Concentration limits for residues (mg/kg)
Nickel cyanide	557-19-7	7xE-01
Nitric oxide	10102-43-9	4xE+00
Nitrobenzene	98-95-3	2xE-02
N-Nitrosodi-n-butylamine	924-16-3	6xE-05
N-Nitrosodiethylamine	55-18-5	2xE-06
N-Nitroso-N-methylurea	684-93-5	1xE-07
N-Nitrosopyrrolidine	930-55-2	2xE-04
Pentachlorobenzene	608-93-5	3xE-02
Pentachloronitrobenzene (PCNB)	82-68-8	1xE-01
Pentachlorophenol	87-86-5	1xE+00
Phenol	108-95-2	1xE+00
Phenylmercury acetate	62-38-4	3xE-03
Phosphine	7803-51-2	1xE-02
Polychlorinated biphenyls, N.O.S	1336-36-3	5xE-05
Potassium cyanide	151-50-8	2xE+00
Potassium silver cyanide	506-61-6	7xE+00
Pronamide	23950-58-5	3xE+00
Pyridine	110-86-1	4xE-02
Reserpine	50-55-5	3xE-05
Selenourea	630-10-4	2xE-01
Silver cyanide	506-64-9	4xE+00
Sodium cyanide	143-33-9	1xE+00
Strychnine	57-24-9	1xE-02
1,2,4,5-Tetrachlorobenzene	95-94-3	1xE-02
1,1,2,2-tetrachloroethane	79-34-5	2xE-03
Tetrachloroethylene	127-18-4	7xE-01
2,3,4,6-Tetrachlorophenol	58-90-2	1xE-02
Tetraethyl lead	78-00-2	4xE-06
Thiourea	62-56-6	2xE-04
Toluene	108-88-3	1xE+01
Toxaphene	8001-35-2	5xE-03
1,1,2-Trichloroethane	79-00-5	6xE-03
Trichloroethylene	79-01-6	5xE-03
Trichloromonofluoromethane	75-69-4	1xE+01
2,4,5-Trichlorophenol	95-95-4	4xE+00
2,4,6-Trichlorophenol	88-06-2	4xE+00
Vanadium pentoxide	1314-62-1	7xE-01
Vinyl chloride	75-01-4	2xE-03

***Note 1:** The health-based concentration limits for ch. NR 661, Appendix VIII constituents for which a health-based concentration is not provided below is 2xE-06 mg/kg.

Note 2: The levels specified in this appendix and the default level of 0.002 micrograms per kilogram or the level of detection for constituents as identified in Note 1 are administratively stayed under the condition, for those constituents specified in s. NR 666.112(2)(a), that the owner or operator complies

WA-10-05

with alternative levels defined as the land disposal restriction limits specified in s. NR 668.43 for F039 nonwastewaters. See s. NR 666.112(2)(b)1.

Chapter NR 666

APPENDIX VIII**ORGANIC COMPOUNDS FOR WHICH RESIDUES SHALL BE ANALYZED**

Volatiles	Semivolatiles
Benzene	Bis(2-ethylhexyl)phthalate
Toluene	Naphthalene
Carbon tetrachloride	Phenol
Chloroform	Diethyl phthalate
Methylene chloride	Butyl benzyl phthalate
Trichloroethylene	2,4-Dimethylphenol
Tetra chloroethylene	o-Dichlorobenzene
1,1,1-Trichloroethane	m-Dichlorobenzene
Chlorobenzene	p-Dichlorobenzene
cis-1,4-Dichloro-2-butene	Hexachlorobenzene
Bromochloromethane	2,4,6-Trichlorophenol
Bromodichloromethane	Fluoranthene
Bromoform	o-Nitrophenol
Bromomethane	1,2,4-Trichlorobenzene
Methylene bromide	o-Chlorophenol
Methyl ethyl ketone	Pentachlorophenol
	Pyrene
	Dimethyl phthalate
	Mononitrobenzene
	2,6-Toluene diisocyanate
	Polychlorinated dibenzo-p-dioxins ¹
	Polychlorinated dibenzo-furans ¹

¹Analyses for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-furans are required only for residues collected from areas downstream of the combustion chamber (e.g., ductwork, boiler tubes, heat exchange surfaces, air pollution control devices, etc.).

Note: Analysis is not required for those compounds that do not have an established F039 nonwastewater concentration limit.

Chapter NR 666

APPENDIX IX

**METHODS MANUAL FOR COMPLIANCE WITH THE BIF RULES BURNING HAZARDOUS
WASTE IN BOILERS AND INDUSTRIAL FURNANCES**

TABLE OF CONTENTS

1.0	Introduction
2.0	Performance Specifications for Continuous Emission Monitoring Systems
2.1	Performance Specifications for Continuous Emission Monitoring of Carbon Monoxide and Oxygen for Incinerators, Boilers, and Industrial Furnaces Burning Hazardous Waste
2.2	Performance Specifications for Continuous Emission Monitoring of Hydrocarbons for Incinerators, Boilers, and Industrial Furnaces
3.0	Sampling and Analytical Methods
4.0	Procedure for Estimating Toxicity Equipment or Chlorinated Dibenzo-P-Dioxin and Dibenzofuran Congeners
5.0	Hazardous Waste Combustion Air Quality Screening Procedure
6.0	Simplified Land Use Classification Procedure for Compliance With Tier I and Tier II Limits
7.0	Statistical Methodology for Bevill Residue Determinations
8.0	Procedures for Determining Default Values for Air Pollution Control System Removal Efficiencies
8.1	APCS RE Default Values for Metals
8.2	APCS RE Default Values for HCl and Cl ₂
8.3	APCS RE Default Values for Ash
8.4	References
9.0	Procedures for Determining Default Values for Partitioning of Metals, Ash and Total Chloride/Chlorine
9.1	Partitioning Default Value for Metals
9.2	Special Procedures for Chlorine, HCl and Cl ₂
9.3	Special Procedures for Ash
9.4	Use of Engineering Judgement to Estimate Partitioning and APCS RE Values
9.5	Restrictions on Use of Test Data
10.0	Alternate Methodology for Implementing Metals Controls
10.1	Applicability
10.2	Introduction
10.3	Basis
10.4	Overview
10.5	Implementation Procedures
10.6	Precompliance Procedures
Appendix A—Statistics	

SECTION 1.0 INTRODUCTION

This document presents required methods for demonstrating compliance with the regulations for boilers and industrial furnaces (BIFs) burning hazardous waste in subch. H. Included in this document are:

1. Performance Specifications for Continuous Emission Monitoring (CEM) of Carbon Monoxide, Oxygen, and Hydrocarbons in Stack Gases.
2. Sampling and Analytical (S&A) Methods for Multiple Metals, Hexavalent Chromium, HCl and Chlorine, Polychlorinated Dibenzo-p-dioxins and Dibenzofurans, and Aldehydes and Ketones.
3. Procedures for Estimating the Toxicity Equivalency of Chlorinated Dibenzo-p-dioxin and Dibenzofuran Congeners.
4. Hazardous Waste Combustion Air Quality Screening Procedures (HWCAQSP).
5. Simplified Land Use Classification Procedure for Compliance with Tier I and Tier II Limits.
6. Statistical Methodology for Bevill Residue Determinations.
7. Procedures for Determining Default Values for Air Pollution Control System Removal Efficiencies.
8. Procedures for Determining Default Values for Partitioning of Metals, Ash, and Total Chloride/Chlorine.
9. Alternate Methodology for Implementing Metals Controls.

Additional methods referenced in subch. H but not included in this document can be found in 40 CFR parts 60 and 61, and "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, incorporated by reference in s. NR 660.11.

The CEM performance specifications of section 2.0, the S&A methods of section 3.0 and the toxicity equivalency procedure for dioxins and furans of section 4.0 are required procedures for determining compliance with BIF regulations. The CEM performance specifications and the S&A methods are interim. The finalized CEM performance specifications and methods will be published in SW-846 or 40 CFR parts 60 and 61.

SECTION 2.0 PERFORMANCE SPECIFICATIONS FOR CONTINUOUS EMISSION MONITORING SYSTEMS

2.1 Performance Specifications for Continuous Emission Monitoring of Carbon Monoxide and Oxygen for Incinerators, Boilers, and Industrial Furnaces Burning Hazardous Waste

2.1.1 Applicability and Principle

2.1.1.1 Applicability. These performance specifications apply to carbon monoxide (CO) and oxygen (O₂) continuous emission monitoring systems (CEMSs) installed on incinerators, boilers, and industrial furnaces burning hazardous waste. The specifications include procedures which are intended to be used to evaluate the acceptability of the CEMS at the time of its installation or whenever specified in regulations or licenses. The procedures are not designed to evaluate CEMS performance over an extended period of time. The source owner or operator is responsible for the proper calibration, maintenance, and operation of the CEMS at all times.

2.1.1.2 Principle. Installation and measurement location specifications, performance and equipment specifications, test and data reduction procedures, and brief quality assurance guidelines are included in the specifications. Calibration drift, relative accuracy, calibration error, and response time tests are conducted to determine conformance of the CEMS with the specifications.

2.1.2 Definitions

2.1.2.1 Continuous Emission Monitoring System (CEMS). A continuous monitor is one in which the sample to be analyzed passes the measurement section of the analyzer without interruption, and which evaluates the detector response to the sample at least once each 15 seconds and computes and records the

results at least every 60 seconds. A CEMS consists of all the equipment used to acquire data and includes the sample extraction and transport hardware, the analyzer(s), and the data recording/processing hardware and software.

2.1.2.2 Monitoring System Types. The specifications require CEMSs capable of accepting calibration gases. Alternative system designs may be used if approved by the department. There are 2 basic types of monitoring systems: extractive and in-situ.

2.1.2.2.1 Extractive. Systems that use a pump or other mechanical, pneumatic, or hydraulic means to draw a sample of the stack or flue gas and convey it to a remotely located analyzer.

2.1.2.2.2 In-situ. Systems that perform an analysis without removing a sample from the stack. Point in-situ analyzers place the sensing or detecting element directly in the flue gas stream. Cross-stack in-situ analyzers measure the parameter of interest by placing a source beam on one side of the stack and the detector (in single-pass instruments) or a retroreflector (in double-pass instruments) on the other side, and measuring the parameter of interest (e.g., CO) by the attenuation of the beam by the gas in its path.

2.1.2.3 Instrument Measurement Range. The difference between the minimum and maximum concentration that can be measured by a specific instrument. The minimum is often stated or assumed to be 0 and the range expressed only as the maximum.

2.1.2.4 Span or Span Value. Full scale instrument measurement range.

2.1.2.5 Calibration Drift (CD). The difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment takes place. A CD test is performed to demonstrate the stability of the CEMS calibration over time.

2.1.2.6 Response Time. The time interval between the start of a step change in the system input (e.g., change of calibration gas) and the time when the data recorder displays 95% of the final value.

2.1.2.7 Accuracy. A measure of agreement between a measured value and an accepted or true value, expressed as the percentage difference between the true and measured values relative to the true value. For these performance specifications, accuracy is checked by conducting a calibration error (CE) test and a relative accuracy (RA) test. Certain facilities, such as those using solid waste or batch-fed processes, may observe long periods of almost no CO emissions with brief, high-level CO emission spikes. These facilities, as well as facilities whose CO emissions never exceed 5-10 ppm, may need to be exempted from the RA requirement because the RA test procedure cannot ensure acquisition of meaningful test results under these conditions. An alternative procedure for accuracy determination is described in section 2.1.9.

2.1.2.8 Calibration Error (CE). The difference between the concentration indicated by the CEMS and the known concentration of the cylinder gas. A CE test procedure is performed to document the accuracy and linearity of the monitoring equipment over the entire measurement range.

2.1.2.9 Relative Accuracy (RA). A comparison of the CEMS response to a value measured by a performance test method (PTM). The PA test is used to validate the calibration technique and verify the ability of the CEMS to provide representative and accurate measurements.

2.1.2.10 Performance Test Method (PTM). The sampling and analysis procedure used to obtain reference measurements for comparison to CEMS measurements. The applicable test methods are Method 10, 10A, or 10B (for the determination of CO) and Method 3 or 3A (for the determination of O_2). These methods are found in 40 CFR part 60, Appendix A, incorporated by reference in s. NR 660.11.

2.1.2.11 Performance Specification Test (PST) Period. The period during which CD, CE, response time, and RA tests are conducted.

2.1.2.12 Centroidal Area. A concentric area that is geometrically similar to the stack or duct cross section and is no greater than one percent of the stack or duct cross-sectional area.

2.1.3 Installation and Measurement Location Specifications

2.1.3.1 CEMS Installation and Measurement Locations. The CEMS shall be installed in a location in which measurements representative of the source's emissions can be obtained. The optimum location of the sample interface for the CEMS is determined by a number of factors, including ease of access for calibration and maintenance, the degree to which sample conditioning will be required, the degree to which it represents total emissions, and the degree to which it represents the combustion situation in the firebox. The location should be as free from in-leakage influences as possible and reasonably free from severe flow disturbances. The sample location should be at least 2 equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs and at least 0.5 diameter upstream from the exhaust or control device. The equivalent duct diameter is calculated as per section 2.1 of 40 CFR part 60, Appendix A, method 1, incorporated by reference in s. NR 660.11. If these criteria are not achievable or if the location is otherwise less than optimum, the possibility of stratification should be checked as described in Section 2.1.3.3 to determine whether the location would cause failure of the relative accuracy test.

2.1.3.1.1 For extractive or point in-situ CEMSs, the measurement point should be within or centrally located over the centroidal area of the stack or duct cross section.

2.1.3.1.2 For cross-stack CEMSs, the effective measurement path should (1) have at least 70% of the path within the inner 50% of the stack or duct cross-sectional area or (2) be centrally located over any part of the centroidal area.

2.1.3.1.3 Both the CO and O₂ monitors should be installed at the same general location. If this is not possible, they may be installed at different locations if the effluent gases at both sample locations are not stratified and there is no in-leakage of air between sampling locations.

2.1.3.2 Performance Test Method (PTM) Measurement Location and Traverse Points.

2.1.3.2.1 Select an accessible PTM measurement point at least 2 equivalent diameters downstream from the nearest control device, the point of CO generation, or other point at which a change in the CO concentration may occur, and at least 1/2 equivalent diameter upstream from the effluent exhaust or control device. When pollutant concentration changes are due solely to diluent leakage (e.g., air heater leakages) and CO and O₂ are simultaneously measured at the same location, 1/2 diameter may be used in place of 2 equivalent diameters. The CEMS and PTM locations need not be the same.

2.1.3.2.2 Select traverse points that ensure acquisition of representative samples over the stack or duct cross section. At a minimum, establish a measurement line that passes through the centroidal area in the direction of any expected stratification. If this line interferes with the CEMS measurements, displace the line up to 30 cm (or 5% of the equivalent diameter of the cross section, whichever is less) from the centroidal area. Locate 3 traverse points at 17, 50, and 83% of the measurement line. If the measurement line is no longer than 2.4 meters and pollutant stratification is not expected, the tester may choose to locate the 3 traverse points on the line at 0.4, 1.2, and 2.0 meters from the stack or duct wall. This option may not be used at a site located within 8 equivalent diameters downstream of a flow disturbance. The tester may select other traverse points, if they can be shown to the satisfaction of the department to provide a representative sample over the stack or duct cross-section. Conduct all necessary PTM tests within 3 cm of the selected traverse points. Sampling may not be performed within 3 cm of the duct or stack inner wall.

2.1.3.3 Stratification Test Procedure. Stratification is defined as a difference in excess of 10% between the average concentration in the duct or stack and the concentration at any point more than 1.0 meter from the duct or stack wall. To determine whether effluent stratification exists, a dual probe system should be used to determine the average effluent concentration while measurements at each traverse point are being made. One probe, located at the stack or duct centroid, is used as a stationary reference point to indicate the change in effluent concentration over time. The second probe is used for sampling at the traverse points specified in 40 CFR part 60, Appendix A, method 1, incorporated by reference in s. NR

660.11. The monitoring system samples sequentially at the reference and traverse points throughout the testing period for 5 minutes at each point.

2.1.4 CEMS Performance and Equipment Specifications

Table 2.1-1 summarizes the performance specifications for the CEMSs. Two sets of standards for CO are given; one for low-range and another for high-range measurements. The high-range specifications relate to measurement and quantification of short duration high concentration peaks, while the low-range specifications relate to the overall average operating condition of the burning device. The dual-range specifications can be met by using (1) one analyzer for each range, (2) a dual range unit, or (3) a single measurement range instrument capable of meeting both specifications with a single unit. Adjustments cannot be made to the analyzer between determinations of low- and high-level accuracy within the single measurement range. In the second case, when the concentration exceeds the span of the lower range, the data acquisition system recorder shall switch to the high range automatically.

2.1.4.1 CEMS Span Value. In order to measure high and low concentrations with the same or similar degree of accuracy, the maximum ranges (span values) are specified for low and high range analyzers. The span values are listed in Table 2.1-2. Tier I and Tier II format definitions are established in subch. H.

Table 2.1-1
Performance Specifications of CO and O₂ Monitors

Parameter	CO monitors		O ₂ monitors
	Low range	High range	
Calibration drift 24 hours.	<6 ppm ¹	<90 ppm	<0.5% O ₂
Calibration error.	<10 ppm ¹	<150 ppm	<0.5% O ₂
Response time.	<2 min	<2 min	<2 min
Relative accuracy ² .	(³)	(³)	(incorporated in CO RA calculation)

¹For Tier II, CD and CE are 3% and 5% of twice the license limit, respectively.

²Expressed as the sum of the mean absolute value plus the 95% confidence interval of a series of measurements.

³The greater of 10% of PTM or 10 ppm.

Table 2.1-2
CEMS Span Values for CO and O₂ Monitors

	CO monitors		O ₂ monitors (percent)
	Low range (ppm)	High range (ppm)	
Tier I rolling average format.	200	3,000	25
Tier II rolling average format.	2 x license limit.	3,000	25

2.1.4.2 Daily Calibration Gas Values. The owner or operator shall choose calibration gas concentrations (or calibration filters for in-situ systems) that include zero and high-level calibration values for the daily calibration checks. For a single measurement range monitor, 3 CO calibration gas concentrations (or calibration filters for in-situ systems) shall be used, i.e., the zero and high-level concentrations of the low-range CO analyzer and the high-level concentration of the high-range CO analyzer.

2.1.4.2.1 The zero level for the CO or O₂ analyzer may be between 0 and 20% of the span value, e.g., 0-40 ppm for low-range CO analyzer, 0-600 ppm for the high-range CO analyzer, and 0-5% for the O₂ analyzer (for Tier I).

2.1.4.2.2 The high-level concentration for the CO or O₂ analyzer shall be between 50 and 90% of the span value, i.e., 100-180 ppm for the low-range CO analyzer, 1500-2700 ppm for the high-range CO analyzer, and 12.5-22.5% O₂ for the O₂ analyzer.

2.1.4.3 Data Recorder Scale. The strip chart recorder, computer, or digital recorder shall be capable of recording all readings within the CEMS's measurement range and shall have a resolution of 0.5% of span value, i.e., one ppm CO for low-range CO analyzer, 15 ppm CO for high-range CO analyzer, and 0.1% O₂ for the O₂ analyzer.

2.1.4.4 Response Time. The response time for the CO or O₂ monitor may not exceed 2 minutes to achieve 95% of the final stable value.

2.1.4.5 Calibration Drift. The CEMS shall allow the determination of CD at the zero and high-level values. The CD shall be determined separately for CO and O₂ monitors in terms of concentration. The CO CEMS calibration response may not drift or deviate from the reference value of the calibration gas (or calibration filters for in-situ systems) by more than 3% of the span value after each 24-hour period of the 7-day test, i.e., 6 ppm CO for the low-range analyzer (Tier I) and 90 ppm for the high-range analyzer, at both zero and high levels. The O₂ monitor calibration response may not drift or deviate from the reference value by more than 0.5% O₂ at both zero and high levels.

2.1.4.6 Relative Accuracy. The result of the PA test of the CO CEMS (which incorporates the O₂ monitor) shall be no greater than 10% of the mean value of the PTM results or shall be within 10 ppm CO of the PTM results, whichever is less restrictive. The ppm CO concentration shall be corrected to 7% O₂ before calculating the RA.

2.1.4.7 Calibration Error. The mean difference between the CEMS and reference values at all 3 test points (see Table 2.1-3) shall be no greater than 5% of span value for CO monitors (i.e., 10 ppm CO for low range Tier I CO analyzers and 150 ppm CO for high range CO analyzers) and 0.5% for O₂ analyzers.

2.1.4.8 Measurement and Recording Frequency. The sample to be analyzed shall pass through the measurement section of the analyzer without interruption. The detector shall measure the sample concentration at least once every 15 seconds. An average emission rate shall be computed and recorded at least once every 60 seconds.

2.1.4.9 Hourly Rolling Average Calculation. The CEMS shall calculate every minute an hourly rolling average, which is the arithmetic mean of the 60 most recent one-minute average values.

2.1.4.10 Retest. If the CEMS produces results within the specified criteria, the test is successful. If the CEMS does not meet one or more of the criteria, the necessary corrections shall be made and the performance tests repeated.

2.1.5 Test Periods

2.1.5.1 Pretest Preparation Period. Install the CEMS, prepare the PTM test site according to the specifications in section 2.1.3, and prepare the CEMS for operation and calibration according to the manufacturer's written instructions. A pretest conditioning period similar to that of the 7-day CD test is recommended to verify the operational status of the CEMS.

2.1.5.2 Calibration Drift Test Period. While the facility is operating under normal conditions, determine the CD at 24-hour intervals for 7 consecutive days according to the procedure given in section 2.1.6.1. All CD determinations shall be made following a 24-hour period during which no unscheduled maintenance, repair, or adjustment takes place. If the combustion unit is taken out of service during the test period, record the onset and duration of the downtime and continue the calibration drift test when the unit resumes operation.

2.1.5.3 Relative Accuracy Test Period. Conduct the RA test according to the procedure in section 2.1.6.4 while the facility is operating under normal conditions. RA testing for CO and O₂ shall be conducted simultaneously so that the results can be calculated for CO corrected to 7% O₂. The RA test shall be conducted during the CD test period. It is emphasized that during the CD test period, no adjustments or repairs may be made to the CEMS other than routine calibration adjustments performed immediately following the daily CD determination.

2.1.5.4 Calibration Error Test and Response Time Test Periods. Conduct the CE and response time tests during the CD test period.

2.1.6 Performance Specification Test Procedures

2.1.6.1 Calibration Drift Test.

2.1.6.1.1 Sampling Strategy. Conduct the CD test for all monitors at 24-hour intervals for 7 consecutive days using calibration gases at the 2 (or 3, if applicable) concentration levels specified in section 2.1.4.2. Introduce the calibration gases into the sampling system as close to the sampling probe outlet as practical. The gas shall pass through all filters, scrubbers, conditioners, and other CEMS components used during normal sampling. If periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined. Record the CEMS response and subtract this value from the reference (calibration gas) value. To meet the specification, none of the differences shall exceed the limits specified in Table 2.1-1.

2.1.6.1.2 Calculations. Summarize the results on a data sheet. An example is shown in Figure 2.1-1. Calculate the differences between the CEMS responses and the reference values.

2.1.6.2 Response Time. Check the entire CEMS including sample extraction and transport, sample conditioning, gas analyses, and the data recording.

2.1.6.2.1 Introduce zero gas into the system. For extractive systems, introduce the calibration gases at the probe as near to the sample location as possible. For in-situ system, introduce the zero gas at a point such that all components active in the analysis are tested. When the system output has stabilized (no change greater than one percent of full scale for 30 seconds), switch to monitor stack effluent and wait for a stable value. Record the time (upscale response time) required to reach 95% of the final stable value.

2.1.6.2.2 Next, introduce a high-level calibration gas and repeat the above procedure. Repeat the entire procedure 3 times and determine the mean upscale and downscale response times. The longer of the 2 means is the system response time.

2.1.6.3 Calibration Error Test Procedure.

2.1.6.3.1 Sampling Strategy. Challenge each monitor (both low- and high-range CO and O₂) with zero gas and EPA Protocol 1 cylinder gases at 3 measurement points within the ranges specified in Table 2.1-3.

Table 2.1-3
Calibration Error Concentration Ranges for Tier I

Measurement point	GAS Concentration Ranges		
	CO, ppm		O ₂ , percent
	Low range ¹	High range	
1	0-40	0-600	0-2
2	60-80	900-1200	8-10
3	140-160	2100-2400	14-16

¹For Tier II, the CE specifications for the low-range CO CEMS are 0-20%, 30-40%, and 70-80% of twice the license limit.

SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

LOW RANGE	
HIGH RANGE	

	DAY	DATE	TIME	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE	PERCENT OF SPAN*
ZERO/ LOW LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						
HIGH LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						

*Acceptance Criteria : ≤ 5% of span each day for seven days.

Figure 2.1-1 Calibration Drift Determination

2.1.6.3.1.1 If a single measurement range is used, the calibration gases used in the daily CD checks (if they are Protocol 1 cylinder gases and meet the criteria in section 2.1.6.3.1) may be used for determining CE.

2.1.6.3.1.2 Operate each monitor in its normal sampling mode as nearly as possible. The calibration gas shall be injected into the sample system as close to the sampling probe outlet as practical and should pass through all CEMS components used during normal sampling. Challenge the CEMS 3 non-consecutive times at each measurement point and record the responses. The duration of each gas injection should be sufficient to ensure that the CEMS surfaces are conditioned.

2.1.6.3.2 Calculations. Summarize the results on a data sheet. An example data sheet is shown in Figure 2.1-2. Average the differences between the instrument response and the certified cylinder gas value for each gas. Calculate 3 CE results (5 CE results for a single-range CO CEMS) according to Equation 5 (section 2.1.7.5). No confidence coefficient is used in CE calculations.

2.1.6.4 Relative Accuracy Test Procedure.

2.1.6.4.1 Sampling Strategy for PTM tests. Conduct the PTM tests in such a way that they will yield measurements representative of the emissions from the source and can be correlated to the CEMS data. Although it is preferable to conduct the CO, diluent, and moisture (if needed) simultaneously, moisture measurements that are taken within a 60-minute period which includes the simultaneous CO and O₂ measurements may be used to calculate the dry CO concentration.

Note: At times, CEMS RA tests may be conducted during incinerator performance tests. In these cases, PTM results obtained during CEMS RA tests may be used to determine compliance with

incinerator emissions limits as long as the source and test conditions are consistent with the applicable regulations.

SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

LOW RANGE	
HIGH RANGE	

RUN NUMBER	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE		
			Zero/Low	Mid	High
1 - Zero					
2 - Mid					
3 - High					
4 - Mid					
5 - Zero					
6 - High					
7 - Zero					
8 - Mid					
9 - High					
MEAN DIFFERENCE =					
CALIBRATION ERROR =			%	%	%

Figure 2.1-2 Calibration Error Determination

2.1.6.4.2 Performance Test Methods.

2.1.6.4.2.1 Unless otherwise specified in the regulations, method 3 or 3A and method 10, 10A, or 10B (40 CFR part 60, Appendix A, incorporated by reference in s. NR 660.11) are the test methods for O₂ and CO, respectively. Make a sample traverse of at least 21 minutes, sampling for 7 minutes at each of 3 traverse points (see section 3.2).

2.1.6.4.2.2 When the installed CEMS uses a nondispersive infrared (NDIR) analyzer, method 10 shall use the alternative interference trap specified in section 10.1 of the method. An option, which may be approved by the department in certain cases, would allow the test to be conducted using method 10 without the interference trap. Under this option, a laboratory interference test is performed for the analyzer prior to the field test. The laboratory interference test includes the analysis of SO, NO, and CO calibration gases over the range of expected effluent concentrations. Acceptable performance is indicated if the CO analyzer response to each of the gases is less than one percent of the applicable measurement range of the analyzer.

2.1.6.4.3 Number of PTM Tests. Conduct a minimum of 9 sets of all necessary PTM tests. If more than 9 sets are conducted, a maximum of 3 sets may be rejected at the tester's discretion. The total number of sets used to determine the RA shall be greater than or equal to 9. All data, including the rejected data, shall be reported.

2.1.6.4.4 Correlation of PTM and CEMS Data. The time and duration of each PTM test run and the CEMS response time should be considered in correlating the data. Use the CEMS final output (the one used for reporting) to determine an integrated average CO concentration for each PTM test run. Confirm that the pair of results are on a consistent moisture and O₂ concentration basis. Each integrated CEMS value should then be compared against the corresponding average PTM value. If the CO concentration

measured by the CEMS is normalized to a specified diluent concentration, the PTM results shall be normalized to the same value.

2.1.6.4.5 Calculations. Summarize the results on a data sheet. Calculate the mean of the PTM values and calculate the arithmetic differences between the PTM and the CEMS data sets. The mean of the differences, standard deviation, confidence coefficient, and CEMS RA should be calculated using Equations one through 4.

2.1.7 Equations

2.1.7.1 Arithmetic Mean (\bar{d}). Calculate \bar{d} of the difference of a data set using Equation one.

$$\bar{d} = \frac{1}{n} \sum_{i=1}^n d_i \quad (\text{Eq. one})$$

where:

n=Number of data points.

$$\sum_{i=1}^n d_i = \text{Algebraic sum of the individual differences } d_i.$$

When the mean of the differences of pairs of data is calculated, correct the data for moisture, if applicable.

2.1.7.2 Standard Deviation (S_d). Calculate S_d using Equation 2.

$$s_d = \sqrt{\frac{\sum_{i=1}^n d_i^2 - \frac{\sum_{i=1}^n d_i^2}{n}}{n-1}} \quad (\text{Eq. 2})$$

2.1.7.3 Confidence Coefficient (CC). Calculate the 2.5% error CC (one-tailed) using Equation 3.

$$CC = t_{0.975} \frac{S_d}{\sqrt{n}} \quad (\text{Eq. 3})$$

where:

$t_{0.975}$ =t-value (see Table 2.1-4).

TABLE 2.1-4—T-VALUES

n^a	$t_{0.975}$	n^a	$t_{0.975}$	n^a	$t_{0.975}$
2	12.706	7	2.447	12	2.201
3	4.303	8	2.365	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.662	15	2.145
6	2.571	11	2.228	16	2.131

^aThe values in this table are already corrected for n-1 degrees of freedom. Use n equal to the number of individual values.

2.1.7.4 Relative Accuracy. Calculate the RA of a set of data using Equation 4.

$$RA = \frac{|\bar{d}| + |CC|}{PTM} \times 100 \quad (\text{Eq. 4})$$

where:

$|\bar{d}|$ = Absolute value of the mean of the differences (Equation one).

$|CC|$ = Absolute value of the confidence coefficient (Equation 3).

\bar{d} = Average reference value.

2.1.7.5 Calibration Error. Calculate CE using Equation 5.

$$CE = \left| \frac{\bar{d}}{FS} \right| \times 100 \quad (\text{Eq. 5})$$

where:

\bar{d} = Mean difference between CEMS response and the known reference concentration.

2.1.8 Reporting

At a minimum, summarize in tabular form the results of the CD, RA, response time, and CE test, as appropriate. Include all data sheets, calculations, CEMS data records, and cylinder gas or reference material certifications.

2.1.9 Alternative Procedure

2.1.9.1 Alternative RA Procedure Rationale. Under some operating conditions, it may not be possible to obtain meaningful results using the RA test procedure. This includes conditions where consistent, very low CO emissions or low CO emissions interrupted periodically by short duration, high level spikes are observed. It may be appropriate in these circumstances to waive the PTM RA test and substitute the following procedure.

2.1.9.2 Alternative RA Procedure. Conduct a complete CEMS status check following the manufacturer's written instructions. The check should include operation of the light source, signal receiver, timing mechanism functions, data acquisition and data reduction functions, data recorders, mechanically operated functions (mirror movements, calibration gas valve operations, etc.), sample filters, sample line heaters, moisture traps, and other related functions of the CEMS, as applicable. All parts of the CEMS shall be functioning properly before the RA requirement can be waived. The instruments shall also have successfully passed the CE and CD requirements of the performance specifications. Substitution of the alternative procedure requires approval of the department.

2.1.10 Quality Assurance (QA)

Proper calibration, maintenance, and operation of the CEMS is the responsibility of the owner or operator. The owner or operator shall establish a QA program to evaluate and monitor CEMS performance. As a minimum, the QA program shall include:

2.1.10.1 A daily calibration check for each monitor. The calibration shall be adjusted if the check indicates the instrument's CD exceeds the specification established in section 2.1.4.5. The gases shall be injected as close to the probe as possible to provide a check of the entire sampling system. If an alternative calibration procedure is desired (e.g., direct injections or gas cells), subject to department approval, the adequacy of this alternative procedure may be demonstrated during the initial 7-day CD test. Periodic comparisons of the 2 procedures are suggested.

2.1.10.2 A daily system audit. The audit shall include a review of the calibration check data, an inspection of the recording system, an inspection of the control panel warning lights, and an inspection of the sample transport and interface system (e.g., flowmeters, filters), as appropriate.

2.1.10.3 A quarterly calibration error (CE) test. Quarterly RA tests may be substituted for the CE test when approved by the department on a case-by-case basis.

2.1.10.4 An annual performance specification test.

2.1.11 *References* (incorporated by reference in s. NR 660.11)

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2.2 *Performance Specifications for Continuous Emission Monitoring of Hydrocarbons for Incinerators, Boilers, and Industrial Furnaces Burning Hazardous Waste*

2.2.1 *Applicability and Principle*

2.2.1.1 Applicability. These performance specifications apply to hydrocarbon (HC) continuous emission monitoring systems (CEMSs) installed on incinerators, boilers, and industrial furnaces burning hazardous waste. The specifications include procedures which are intended to be used to evaluate the acceptability of the CEMS at the time of its installation or whenever specified in regulations or licenses. The procedures are not designed to evaluate CEMS performance over an extended period of time. The source owner or operator is responsible for the proper calibration, maintenance, and operation of the CEMS at all times.

2.2.1.2 Principle. A gas sample is extracted from the source through a heated sample line and heated filter (except as provided by section 2.2.10) to a flame ionization detector (FID). Results are reported as

volume concentration equivalents of propane. Installation and measurement location specifications, performance and equipment specifications, test and data reduction procedures, and brief quality assurance guidelines are included in the specifications. Calibration drift, calibration error, and response time tests are conducted to determine conformance of the CEMS with the specifications.

2.2.2 Definitions

2.2.2.1 Continuous Emission Monitoring System (CEMS). The total equipment used to acquire data, which includes sample extraction and transport hardware, analyzer, data recording and processing hardware, and software. The system consists of the following major subsystems:

2.2.2.1.1 Sample Interface. That portion of the system that is used for one or more of the following: Sample acquisition, sample transportation, sample conditioning, or protection of the analyzer from the effects of the stack effluent.

2.2.2.1.2 Organic Analyzer. That portion of the system that senses organic concentration and generates an output proportional to the gas concentration.

2.2.2.1.3 Data Recorder. That portion of the system that records a permanent record of the measurement values. The data recorder may include automatic data reduction capabilities.

2.2.2.2 Instrument Measurement Range. The difference between the minimum and maximum concentration that can be measured by a specific instrument. The minimum is often stated or assumed to be 0 and the range expressed only as the maximum.

2.2.2.3 Span or Span Value. Full scale instrument measurement range.

2.2.2.4 Calibration Gas. A known concentration of a gas in an appropriate diluent gas.

2.2.2.5 Calibration Drift (CD). The difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment takes place. A CD test is performed to demonstrate the stability of the CEMS calibration over time.

2.2.2.6 Response Time. The time interval between the start of a step change in the system input (e.g., change of calibration gas) and the time when the data recorder displays 95% of the final value.

2.2.2.7 Accuracy. A measurement of agreement between a measured value and an accepted or true value, expressed as the percentage difference between the true and measured values relative to the true value. For these performance specifications, accuracy is checked by conducting a calibration error (CE) test.

2.2.2.8 Calibration Error (CE). The difference between the concentration indicated by the CEMS and the known concentration of the cylinder gas. A CE test procedure is performed to document the accuracy and linearity of the monitoring equipment over the entire measurement range.

2.2.2.9 Performance Specification Test (PST) Period. The period during which CD, CE, and response time tests are conducted.

2.2.2.10 Centroidal Area. A concentric area that is geometrically similar to the stack or duct cross section and is no greater than one percent of the stack or duct cross-sectional area.

2.2.3 Installation and Measurement Location Specifications

2.2.3.1 CEMS Installation and Measurement Locations. The CEMS shall be installed in a location in which measurements representative of the source's emissions can be obtained. The optimum location of the sample interface for the CEMS is determined by a number of factors, including ease of access for calibration and maintenance, the degree to which sample conditioning will be required, the degree to which it represents total emissions, and the degree to which it represents the combustion situation in the firebox. The location should be as free from in-leakage influences as possible and reasonably free from

severe flow disturbances. The sample location should be at least 2 equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs and at least 0.5 diameter upstream from the exhaust or control device. The equivalent duct diameter is calculated as per 40 CFR part 60, Appendix A, method 1, section 2.1, incorporated by reference in s. NR 660.11. If these criteria are not achievable or if the location is otherwise less than optimum, the possibility of stratification should be investigated as described in section 2.2.3.2. The measurement point shall be within the centroidal area of the stack or duct cross section.

2.2.3.2 Stratification Test Procedure. Stratification is defined as a difference in excess of 10% between the average concentration in the duct or stack and the concentration at any point more than 1.0 meter from the duct or stack wall. To determine whether effluent stratification exists, a dual probe system should be used to determine the average effluent concentration while measurements at each traverse point are being made. One probe, located at the stack or duct centroid, is used as a stationary reference point to indicate the change in effluent concentration over time. The second probe is used for sampling at the traverse points specified in 40 CFR part 60 Appendix A, method 1, incorporated by reference in s. NR 660.11. The monitoring system samples sequentially at the reference and traverse points throughout the testing period for 5 minutes at each point.

2.2.4 CEMS Performance and Equipment Specifications

If this method is applied in highly explosive areas, caution and care shall be exercised in choice of equipment and installation.

2.2.4.1 Flame Ionization Detector (FID) Analyzer. A heated FID analyzer capable of meeting or exceeding these specifications. Heated systems shall maintain the temperature of the sample gas between 150 °C (300 °F) and 175 °C (350 °F) throughout the system. This requires all system components such as the probe, calibration valve, filter, sample lines, pump, and the FID to be kept heated at all times such that no moisture is condensed out of the system.

Note: As specified in the regulations, unheated HC CEMs may be considered an acceptable interim alternative monitoring technique. For additional notes, see section 2.2.10. The essential components of the measurement system are described below:

2.2.4.1.1 Sample Probe. Stainless steel, or equivalent, to collect a gas sample from the centroidal area of the stack cross-section.

2.2.4.1.2 Sample Line. Stainless steel or Teflon tubing to transport the sample to the analyzer.

Note: Mention of trade names or specific products does not constitute endorsement by the department.

2.2.4.1.3 Calibration Valve Assembly. A heated 3-way valve assembly to direct the zero and calibration gases to the analyzer is recommended. Other methods, such as quick-connect lines, to route calibration gas to the analyzers are applicable.

2.2.4.1.4 Particulate Filter. An in-stack or out-of-stack sintered stainless steel filter is recommended if exhaust gas particulate loading is significant. An out-of-stack filter shall be heated.

2.2.4.1.5 Fuel. The fuel specified by the manufacturer (e.g., 40% hydrogen/60% helium, 40% hydrogen/60% nitrogen gas mixtures, or pure hydrogen) should be used.

2.2.4.1.6 Zero Gas. High purity air with less than 0.1 parts per million by volume (ppm) HC as methane or carbon equivalent or less than 0.1% of the span value, whichever is greater.

2.2.4.1.7 Calibration Gases. Appropriate concentrations of propane gas (in air or nitrogen). Preparation of the calibration gases should be done according to the procedures in EPA Protocol 1. In addition, the manufacturer of the cylinder gas should provide a recommended shelf life for each calibration gas cylinder over which the concentration does not change by more than $\pm 2\%$ from the certified value.

2.2.4.2 CEMS Span Value. 100 ppm propane.

2.2.4.3 Daily Calibration Gas Values. The owner or operator shall choose calibration gas concentrations that include zero and high-level calibration values.

2.2.4.3.1 The zero level may be between 0 and 20 ppm (0 and 20% of the span value).

2.2.4.3.2 The high-level concentration shall be between 50 and 90 ppm (50 and 90% of the span value).

2.2.4.4 Data Recorder Scale. The strip chart recorder, computer, or digital recorder shall be capable of recording all readings within the CEMS's measurement range and shall have a resolution of 0.5 ppm (0.5% of span value).

2.2.4.5 Response Time. The response time for the CEMS may not exceed 2 minutes to achieve 95% of the final stable value.

2.2.4.6 Calibration Drift. The CEMS shall allow the determination of CD at the zero and high-level values. The CEMS calibration response may not differ by more than ± 3 ppm ($\pm 3\%$ of the span value) after each 24-hour period of the 7-day test at both zero and high levels.

2.2.4.7 Calibration Error. The mean difference between the CEMS and reference values at all 3 test points listed below shall be no greater than 5 ppm ($\pm 5\%$ of the span value).

2.2.4.7.1 Zero Level. Zero to 20 ppm (0 to 20% of span value).

2.2.4.7.2 Mid-Level. 30 to 40 ppm (30 to 40% of span value).

2.2.4.7.3 High-Level. 70 to 80 ppm (70 to 80% of span value).

2.2.4.8 Measurement and Recording Frequency. The sample to be analyzed shall pass through the measurement section of the analyzer without interruption. The detector shall measure the sample concentration at least once every 15 seconds. An average emission rate shall be computed and recorded at least once every 60 seconds.

2.2.4.9 Hourly Rolling Average Calculation. The CEMS shall calculate every minute an hourly rolling average, which is the arithmetic mean of the 60 most recent one-minute average values.

2.2.4.10 Retest. If the CEMS produces results within the specified criteria, the test is successful. If the CEMS does not meet one or more of the criteria, necessary corrections shall be made and the performance tests repeated.

2.2.5 Performance Specification Test (PST) Periods

2.2.5.1 Pretest Preparation Period. Install the CEMS, prepare the PTM test site according to the specifications in section 2.2.3, and prepare the CEMS for operation and calibration according to the manufacturer's written instructions. A pretest conditioning period similar to that of the 7-day CD test is recommended to verify the operational status of the CEMS.

2.2.5.2 Calibration Drift Test Period. While the facility is operating under normal conditions, determine the magnitude of the CD at 24-hour intervals for 7 consecutive days according to the procedure given in section 2.2.6.1. All CD determinations shall be made following a 24-hour period during which no unscheduled maintenance, repair, or adjustment takes place. If the combustion unit is taken out of service during the test period, record the onset and duration of the downtime and continue the CD test when the unit resumes operation.

2.2.5.3 Calibration Error Test and Response Time Test Periods. Conduct the CE and response time tests during the CD test period.

2.2.6 Performance Specification Test Procedures

2.2.6.1 Calibration Drift Test.

2.2.6.1.1 Sampling Strategy. Conduct the CD test at 24-hour intervals for 7 consecutive days using calibration gases at the 2 daily concentration levels specified in section 2.2.4.3. Introduce the 2 calibration gases into the sampling system as close to the sampling probe outlet as practical. The gas shall pass through all CEM components used during normal sampling. If periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined. Record the CEMS response and subtract this value from the reference (calibration gas) value. To meet the specification, none of the differences shall exceed 3 ppm.

2.2.6.1.2 Calculations. Summarize the results on a data sheet. An example is shown in Figure 2.2-1. Calculate the differences between the CEMS responses and the reference values.

2.2.6.2 Response Time. The entire system including sample extraction and transport, sample conditioning, gas analyses, and the data recording is checked with this procedure.

2.2.6.2.1 Introduce the calibration gases at the probe as near to the sample location as possible. Introduce the zero gas into the system. When the system output has stabilized (no change greater than 1 percent of full scale for 30 sec), switch to monitor stack effluent and wait for a stable value. Record the time (upscale response time) required to reach 95% of the final stable value.

2.2.6.2.2 Next, introduce a high-level calibration gas and repeat the above procedure. Repeat the entire procedure 3 times and determine the mean upscale and downscale response times. The longer of the 2 means is the system response time.

2.2.6.3 Calibration Error Test Procedure.

2.2.6.3.1 Sampling Strategy. Challenge the CEMS with zero gas and EPA Protocol 1 cylinder gases at measurement points within the ranges specified in section 2.2.4.7.

2.2.6.3.1.1 The daily calibration gases, if EPA Protocol 1, may be used for this test.

WA-10-05

SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

	DAY	DATE	TIME	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE	PERCENT OF SPAN*
ZERO/ LOW LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						
HIGH LEVEL	1						
	2						
	3						
	4						
	5						
	6						
	7						

*Acceptance Criteria : $\leq 3\%$ of span each day for seven days.

Figure 2.2-1 Calibration Drift Determination

2.2.6.3.1.2 Operate the CEMS as nearly as possible in its normal sampling mode. The calibration gas should be injected into the sampling system as close to the sampling probe outlet as practical and shall pass through all filters, scrubbers, conditioners, and other monitor components used during normal sampling. Challenge the CEMS three non-consecutive times at each measurement point and record the responses. The duration of each gas injection should be for a sufficient period of time to ensure that the CEMS surfaces are conditioned.

2.2.6.3.2 Calculations. Summarize the results on a data sheet. An example data sheet is shown in Figure 2.2-2. Average the differences between the instrument response and the certified cylinder gas value for each gas. Calculate three CE results according to Equation 1. No confidence coefficient is used in CE calculations.

2.2.7 Equations

2.2.7.1 Calibration Error. Calculate CE using Equation 1.

$$CE = \left| \frac{\bar{d}}{FS} \right| \times 100 \quad (\text{Eq. 1})$$

where:

\bar{d} = Mean difference between CEMS response and the known reference concentration.

2.2.8 Reporting

At a minimum, summarize in tabular form the results of the CD, response time, and CE test, as appropriate. Include all data sheets, calculations, CEMS data records, and cylinder gas or reference material certifications.

SOURCE:	DATE:
MONITOR:	LOCATION:
SERIAL NUMBER:	SPAN:

RUN NUMBER	CALIBRATION VALUE	MONITOR RESPONSE	DIFFERENCE		
			Zero/Low	Mid	High
1 - Zero					
2 - Mid					
3 - High					
4 - Mid					
5 - Zero					
6 - High					
7 - Zero					
8 - Mid					
9 - High					
MEAN DIFFERENCE =					
CALIBRATION ERROR =			%	%	%

Figure 2.2-2 Calibration Error Determination

2.2.9 Quality Assurance (QA)

Proper calibration, maintenance, and operation of the CEMS is the responsibility of the owner or operator. The owner or operator shall establish a QA program to evaluate and monitor CEMS performance. As a minimum, the QA program shall include:

2.2.9.1 A daily calibration check for each monitor. The calibration shall be adjusted if the check indicates the instrument's CD exceeds 3 ppm. The gases shall be injected as close to the probe as possible to provide a check of the entire sampling system. If an alternative calibration procedure is desired (e.g., direct injections or gas cells), subject to department approval, the adequacy of this alternative procedure may be demonstrated during the initial 7-day CD test. Periodic comparisons of the 2 procedures are suggested.

2.2.9.2 A daily system audit. The audit shall include a review of the calibration check data, an inspection of the recording system, an inspection of the control panel warning lights, and an inspection of the sample transport and interface system (e.g., flowmeters, filters), as appropriate.

2.2.9.3 A quarterly CE test. Quarterly RA tests may be substituted for the CE test when approved by the department on a case-by-case basis.

2.2.9.4 An annual performance specification test.

2.2.10 Alternative Measurement Technique

The regulations allow gas conditioning systems to be used in conjunction with unheated HC CEMs during an interim period. This gas conditioning may include cooling to not less than 40° F and the use of condensate traps to reduce the moisture content of sample gas entering the FID to less than 2%. The gas conditioning system, however, may not allow the sample gas to bubble through the condensate as this would remove water soluble organic compounds. All components upstream of the conditioning system should be heated as described in section 2.2.4 to minimize operating and maintenance problems.

2.2.11 *References* (incorporated by reference in s. NR 660.11)

1. Measurement of Volatile Organic Compounds-Guideline Series. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 27711, EPA-450/2-78-041, June 1978.
2. Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors (Protocol No. 1). U.S. Environmental Protection Agency ORD/EMSL, Research Triangle Park, North Carolina, 27711, June 1978.
3. Gasoline Vapor Emission Laboratory Evaluation-Part 2. U.S. Environmental Protection Agency, OAQPS, Research Triangle Park, North Carolina, 27711, EMB Report No. 76-GAS-6, August 1975.

3.0 SAMPLING AND ANALYTICAL METHODS

Note: The sampling and analytical methods to the BIF manual are published in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA SW-846, as incorporated by reference in s. NR 660.11.

SECTION 4.0 PROCEDURE FOR ESTIMATING THE TOXICITY EQUIVALENCE OF CHLORINATED DIBENZO-P-DIOXIN AND DIBENZOFURAN CONGENERS

PCDDs and PCDFs shall be determined using the method given in section 3.4 of this document. In this method, individual congeners or homologues¹ are measured and then summed to yield a total PCDD/PCDF value. No toxicity factors are specified in the method to compute risks from such emissions.

For the purpose of estimating risks posed by emissions from boilers and industrial furnaces, however, specific congeners and homologues shall be measured using the specified method and then multiplied by the assigned toxicity equivalence factors (TEFs), using procedures described in "Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs and CDFs) and 1989 Update", EPA/625/3-89/016, March 1989, incorporated by reference in s. NR 660.11. The resulting 2,3,7,8-TCDD equivalents value is used in the subsequent risk calculations and modeling efforts as discussed in the BIF final rule.

The procedure for calculating the 2,3,7,8-TCDD equivalent is as follows:

1. Using method 23, determine the concentrations of 2,7,8-congeners of various PCDDs and PCDFs in the sample.

¹ The term "congener" refers to any one particular member of the same chemical family; e.g., there are 75 congeners of chlorinated dibenzo-p-dioxins. The term "homologue" refers to a group of structurally related chemicals that have the same degree of chlorination. For example, there are eight homologues of CDs, monochlorinated through octachlorinated. Dibenzo-p-dioxins and dibenzofurans that are chlorinated at the 2,3,7, and 8 positions are denoted as "2378" congeners, except when 2,3,7,8-TCDD is uniquely referred to: e.g., 1,2,3,7,8-PeCDF and 2,3,4,7,8-PeCDF are both referred to as "2378-PeCDFs."

2. Multiply the congener concentrations in the sample by the TEF listed in Table 4.0-1 to express the congener concentrations in terms of 2,3,7,8-TCDD equivalent. Note that congeners not chlorinated at 2,3,7, and 8 positions have a zero toxicity factor in this table.

3. Add the products obtained in step 2, to obtain the total 2,3,7,8-TCDD equivalent in the sample.

Sample calculations are provided in EPA document No. EPA/625/3-89/016, March 1989, incorporated by reference in s. NR 660.11.

TABLE 4.0-1.-2,3,7,8-TCDD TOXICITY EQUIVALENCE FACTORS
(TEFs)¹

Compound	I-TEFs, 89
Mono-, Di- and TriCDDs.....	0
2,3,7,8-TCDD	1
Other TCDDs	0
2,3,7,8-PeCDD	0.5
Other PeCDDs.....	0
2378-HxCDDs	0.1
Other HxCDDs.....	0
2,3,7,8-HpCDD.....	0.01
Other HpCDDs.....	0
OCDD	0.001
Mono-, Di- and TriCDFs	0
2,3,7,8-TCDF	0.1
Other TCDFs.....	0
1,2,3,7,8-PeCDF	0.05
2,3,4,7,8-PeCDF	0.5
Other PeCDFs	0
2378-HxCDFs	0.1
Other HxCDFs	0
2378-HpCDFs	0.01
Other HpCDFs	0
OCDF	0.001

Reference: Adapted from NATO/CCMS, 1988a.

¹Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans (CDDs and CDFs) 1989 Update EPA/625/3-89/016, March 1989, incorporated by reference in s. NR 660.11.

SECTION 5.0 HAZARDOUS WASTE COMBUSTION AIR QUALITY SCREENING PROCEDURE

The HWCAQSP is a combined calculation/reference table approach for conservatively estimating short-term and annual average facility impacts for stack emissions. The procedure is based on extensive short-term modeling of 11 generic source types and on a set of adjustment factors for estimating annual average concentrations from short-term concentrations. Facility impacts may be determined based on the selected worst-case stack or on multiple stacks, in which the impacts from each stack are estimated separately and then added to produce the total facility impact.

This procedure is most useful for facilities with multiple stacks, large source-to-property boundary distances, and complex terrain between one and 5 km from the facility. To ensure a sufficient degree of conservatism, the HWCAQSP may not be used if any of the 5 screening procedure limitations listed below are true:

- The facility is located in a narrow valley less than 1 km wide;
- The facility has a stack taller than 20 m and is located such that the terrain rises to the stack height within 1 km of the facility;
- The facility has a stack taller than 20 m and is located within 5 km of the shoreline of a large body of water;
- The facility property line is within 200 m of the stack and the physical stack height is less than 10 m; or
- On-site receptors are of concern, and stack height is less than 10 m.

If any of these criteria are met or the department determines that this procedure is not appropriate, then detailed site-specific modeling or modeling using the "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources," EPA -450/4-88-010, Office of Air Quality Planning and Standards, August 1988, incorporated by reference in s. NR 660.11, is required. Detailed site-specific dispersion modeling shall conform to the EPA "Guidance on Air Quality Models (Revised)", EPA 450/2-78-027R, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July 1986, incorporated by reference in s. NR 660.11. This document provides guidance on both the proper selection and regulatory application of air quality models.

Introduction

The Hazardous Waste Combustion Air Quality Screening Procedure (HWCAQSP) (also referred to hereafter as "the screening procedure" or "the procedure") provides a quick, easy method for estimating maximum (hourly) and annual average ambient air impacts associated with the combustion of hazardous waste. The methodology is conservative in nature and estimates dispersion coefficients² based on facility-specific information.

The screening procedure can be used to determine emissions limits at sites where the nearest meteorological (STAR) station is not representative of the meteorology at the site. If the screen shows that emissions from the site are adequately protective, then the need to collect site-specific meteorological data can be eliminated.

The screening procedure is generally most helpful for facilities meeting one or more of the following conditions:

- Multiple stacks with substantially different release specifications (e.g., stack heights differ by >50%, exit temperatures differ by >50 °K, or the exit flow rates differ by more than a factor of 2),
- Terrain located between 1 km and 5 km from the site increases in elevation by more than the physical height of the shortest stack (i.e., the facility is located in complex terrain), or
- Significant distance between the facility's stacks and the site boundary [guidance on determining whether a distance is "significant" is provided in Step 6(B) of the procedure].

Steps 1 through 9 of the screening procedure present a simplified method for determining emissions based on the use of the "worst-case" stack. If the simplified method shows that desired feed rates result in emissions that exceed allowable limits for one or more pollutants, a refined analysis to examine the emissions from each stack can be conducted. This multiple-stack method is presented in Step 10.

² The term dispersion coefficient refers to the change in ambient air concentration ($\mu\text{g}/\text{m}^3$) resulting from a source with an emission rate of 1 g/sec.

The steps involved in screening methodology are as follows:

- Step 1. Define Source Characteristics
- Step 2. Determine the Applicability of the Screening Procedure
- Step 3. Select the Worst-Case Stack
- Step 4. Verify Good Engineering Practice (GEP) Criteria
- Step 5. Determine the Effective Stack Height and Terrain-Adjusted Effective Stack Height
- Step 6. Classify the Site as Urban or Rural
- Step 7. Determine Maximum Dispersion Coefficients
- Step 8. Estimate Maximum Ambient Air Concentrations
- Step 9. Determine Compliance With Regulatory Limits
- Step 10. Multiple Stack Method

Step 1: Define Source Characteristics

Provide the following source data:³

Stack Data:	Stack No. 1	Stack No. 2	Stack No. 3
Physical stack height (m)	_____	_____	_____
Exhaust temperature (°K)	_____	_____	_____
Flow rate (m ³ /sec)	_____	_____	_____

Nearby Building Dimensions

Consider all buildings within 5 building heights or 5 maximum projected widths of the stack(s). For the building with the greatest height, fill in the spaces below. Building Height (m) _____ Maximum projected building width (m) _____

Nearby Terrain Data

Determine maximum terrain rise for the following 3 distance ranges from the facility (not required if the highest stack is less than 10 m in height):

_____ (m) _____ (m) _____ (m)
 0-0.5 km 0-2.5 km 0-5 km

Distance from facility to nearest shoreline (km) _____

Valley width (km) _____

Step 2: Determine the Applicability of the Screening Procedure

Fill in the following data:

	Yes	No
_____	_____	_____

³ Worksheet space is provided for three stacks. If the facility has additional stacks, copy the form and revise stack identification numbers for 4, 5, etc.

WA-10-05

Is the facility in a valley < km in width?..... _____

Is the terrain rise within 1 km of the facility greater than the physical stack height of the tallest stack? (Only applies to stacks ≤ 20 meters in height)..... _____

Is the distance to the nearest shoreline <5 km? (Only applies to facilities with stacks ≤ 20 meters in height)..... _____

For the building listed in Step 1, is the closest property boundary <5 times the building height or <5 times the maximum projected building width? (Only applies to facilities with a stack height <2.5 times the building height)..... _____

If the answer is "no" to all the preceding questions, then the HWCAQSP is acceptable. If the answer to any question is "yes", the procedure is not acceptable.

Step 3: Select the Worst-Case Stack

If the facility has several stacks, a worst-case stack shall be chosen to conservatively represent release conditions at the facility. Follow the steps below to identify the worst-case stack.

Apply the following equation to each stack:

$K = HVT$

where:

K=an arbitrary parameter accounting for the relative influence of the stack height and plume rise.

H=Physical stack height (m)

V=Flow rate (m^3/sec)

T=Exhaust temperature ($^{\circ}\text{K}$)

Complete the following table to compute the "K" value for each stack:

Stack No.	Stack height (m)	\times	Flow rate (m^3/sec)	\times	Exit temp ($^{\circ}\text{K}$)	=	K
1	_____	\times	_____	\times	_____	=	_____
2	_____	\times	_____	\times	_____	=	_____
3	_____	\times	_____	\times	_____	=	_____

Select the stack with the lowest "K" value. This is the worst-case stack that will be used for Steps 4 through 9.

Worst-Case Stack is identified as Stack No. ____

Step 4: Verify Good Engineering Practice (GEP) Criteria

Confirm that the selected worst-case stack meets Good Engineering Practice (GEP) criteria. The stack height to be used in the subsequent steps of this procedure may not be greater than the maximum GEP. Maximum and minimum GEP stack heights are defined as follows:

CEP (minimum)= $H+(1.5 \times L)$

GEP (maximum)=greater of 65 m or $H+(1.5 \times L)$

where:

H=height of the building selected in Step 1 measured from ground level elevation at the base of the stack

L=the lesser dimension of the height or projected width of the building selected in Step 1

Record the following data for the worst-case stack:

Stack height (m)= _____

H(m)= _____

L(m)= _____

Then compute the following:

GEP (minimum) (m)= _____

GEP (maximum) (m)= _____

- If the physical height of the worst-case stack exceeds the maximum GEP, then use the maximum GEP stack height for the subsequent steps of this analysis;
- If the physical height of the worst-case stack is less than the minimum GEP, then use generic source number 11 as the selected source for further analysis and proceed directly to Step 6;
- If the physical height of the worst-case stack is between the minimum and maximum GEP, then use the actual physical stack height for the subsequent steps of this analysis.

Step 5: Determine the Effective Stack Height and the Terrain-Adjusted Effective Stack Height (TAESH)

The effective stack height is an important factor in dispersion modeling. The effective stack height is the physical height of the stack plus plume rise. As specified in Step 4, the stack height used to estimate the effective stack height may not exceed GEP requirements. Plume rise is a function of the stack exit gas temperature and flow rate.

In this analysis, the effective stack height is used to select the generic source that represents the dispersion characteristics of the facility. For facilities located in flat terrain and for all facilities with worst-case stacks less than or equal to 10 meters in height, generic source numbers are selected strictly on the basis of effective stack height. In all other cases, the effective stack height is further adjusted to take into account the terrain rise near the facility. This "terrain-adjusted effective stack height" (TAESH) is then used to select the generic source number that represents the dispersion characteristics of the facility. Follow the steps below to identify the effective stack height, the TAESH (where applicable), and the corresponding generic source number.

(A) Go to Table 5.0-1 and find the plume rise value corresponding to the stack temperature and exit flow rate for the worst-case stack determined in Step 3.

Plume rise= _____ (m)

(B) Add the plume rise to the GEP stack height of the worst-case stack determined in Steps 3 and 4.

GEP stack height (m)	+	Plume rise (m)	=	Effective stack height (m)
_____	+	_____	=	_____

(C) Go to the first column of Table 5.0-2 and identify the range of effective stack heights that includes the effective stack height estimated in Step 5(B). Record the generic source number that corresponds to this range.

Generic source number= _____

(D) If the source is located in flat terrain⁴, or if the generic source number identified in Step 5(C) above is 1 or 11 (regardless of terrain classification), use the generic source number determined in Step 5(C) and proceed directly to Step 6. Otherwise, continue to Step 5(E).

(E) For those situations where the conditions in Step 5(D) do not apply, the effective stack height shall be adjusted for terrain. The TAESH for each distance range is computed by subtracting the terrain rise within the distance range from the effective stack height.⁵

TABLE 5.0-1.—ESTIMATED PLUME RISE (IN METERS) BASED ON STACK EXIT FLOW RATE AND GAS TEMPERATURE

Flow rate (m ³ /s)	Exhaust Temperature (°K)										
	<325	325-349	350-399	400-449	450-499	500-599	600-699	700-799	800-999	1000-1499	>1499
<0.5	0	0	0	0	0	0	0	0	0	0	0
0.5-0.9	0	0	0	0	0	0	0	0	1	1	1
1.0-1.9	0	0	0	0	1	1	2	3	3	3	4
2.0-2.9	0	0	1	3	4	4	6	6	7	8	9
3.0-3.9	0	1	2	5	6	7	9	10	11	12	13
4.0-4.9	1	2	4	6	8	10	12	13	14	15	17
5.0-7.4	2	3	5	8	10	12	14	16	17	19	21
7.5-9.9	3	5	8	12	15	17	20	22	22	23	24
10.0-12.4	4	6	10	15	19	21	23	24	25	26	27
12.5-14.9	4	7	12	18	22	23	25	26	27	28	29
15.0-19.9	5	8	13	20	23	24	26	27	28	29	31
20.0-24.9	6	10	17	23	25	27	29	30	31	32	34
25.0-29.9	7	12	20	25	27	29	31	32	33	35	36
30.0-34.9	8	14	22	26	29	31	33	35	36	37	39
35.0-39.9	9	16	23	28	30	32	35	36	37	39	41
40.0-49.9	10	17	24	29	32	34	36	38	39	41	42
50.0-59.9	12	21	26	31	34	36	39	41	42	44	46
60.0-69.9	14	22	27	33	36	39	42	43	45	47	49
70.0-79.9	16	23	29	35	38	41	44	46	47	49	51
80.0-89.9	17	25	30	36	40	42	46	48	49	51	54
90.0-99.9	19	26	31	38	42	44	48	50	51	53	56
100.0-119.9 ..	21	26	32	39	43	46	49	52	53	55	58
120.0-139.9 ..	22	28	35	42	46	49	52	55	56	59	61
140.0-159.9 ..	23	30	36	44	48	51	55	58	59	62	65
160.0-179.9 ..	25	31	38	46	50	54	58	60	62	65	67
180.0-199.9 ..	26	32	40	48	52	56	60	63	65	67	70

⁴ The terrain is considered flat and terrain adjustment factors are not used if the maximum terrain rise within 5 km of the facility (see Step 1) is less than 10 % of the physical stack height of the worst-case stack.

⁵ Refer to Step 1 for terrain adjustment data. Note that the distance from the source to the outer radii of each range is used. For example, for the range >0.5-2.5 km, the maximum terrain rise in the range 0.0-2.5 km is used.

TABLE 5.0-1.—ESTIMATED PLUME RISE (IN METERS) BASED ON STACK EXIT FLOW RATE AND GAS TEMPERATURE

Flow rate (m ³ /s)	Exhaust Temperature (°K)										
	<325	325-349	350-399	400-449	450-499	500-599	600-699	700-799	800-999	1000-1499	>1499
>199.9	26	33	41	49	54	58	62	65	67	69	73

TABLE 5.0-2—SELECTION OF GENERIC SOURCE NUMBER

Effective stack height (m)	Generic source No.
<10.0	1
10.0-14.9	2
15.0-19.9	3
20.0-24.9	4
25.0-30.9	5
31.0-41.9	6
42.0-52.9	7
53.0-64.9	8
65.0-122.9	9
113.0+	10
Downwash	11

TABLE 5.0-3.—CLASSIFICATION OF LAND USE TYPES

Type ¹	Description	Urban or rural designation ²
I1	Heavy Industrial	Urban
I2	Light/Moderate Industrial	Urban
C1	Commercial	Urban
R1	Common Residential (Normal Easements) ..	Rural
R2	Compact Residential (Single Family)	Urban
R3	Compact Residential (Multi-Family)	Rural
R4	Estate Residential (Multi-Acre Plots)	Rural
A1	Metropolitan Natural	Rural
A2	Agricultural	Rural
A3	Undeveloped (Grasses/Weeds)	Rural
A4	Undeveloped (Heavily Wooded).....	Rural
A5	Water Surfaces	Rural

¹EPA, Guideline on Air Quality Models (Revised), EPA-450/2-78-027R, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July, 1986, incorporated by reference in s. NR 660.11.

²Auer, August H. Jr., "Correlation of Land Use and Cover with meteorological Anomalies," Journal of Applied Meteorology, pp. 636-643, 1978.

Distance range	Effective stack-	—	Maximum	=	TAESH(m)
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WA-10-05

(km)	height (m) [see step 5(B)]		terrain-rise (m) (see step 1)		
0.0-0.5	_____	—	_____	=	_____
>0.5-2.5	_____	—	_____	=	_____
>2.5-5.0	_____	—	_____	=	_____

If the terrain rise for any of the distance ranges is greater than the effective stack height, set the TAESH equal to 0 and use generic source number one for that distance range.

Record the generic source numbers from Table 5.0-2 based on each of the TAESH values.

Distance range (km)	Generic source No. (after terrain adjustment)
0.0-0.5	_____
>0.5-2.5	_____
>2.5-5.0	_____

Step 6: Classify the Site as Urban or Rural

(A) Classify the land use near the facility as either urban or rural by determining the percentage of urban land use types (as defined in Table 3; for further guidance see the footnoted references) that fall within 3 km of the facility.⁶

Method Used to Estimate Visual Planimeter
Percent Urban Land Use: _____ _____

Estimated Urban Rural
Percentages. _____ _____

If the urban land use percentage is less than or equal to 30% based on a visual estimate, or 50% based on a planimeter, the local land use is considered rural. Otherwise, the local land use is considered urban.

Classification. (check Urban Rural
applicable space). _____ _____

⁶ The delineation of urban and rural areas, can be difficult for the residential-type areas listed in Table 5.0-3. The degree of resolution in Table 5.0-3 for residential areas often cannot be identified without conducting site area inspections. This process can require extensive analysis, which, for many applications, can be greatly streamlined without sacrificing confidence in selecting the appropriate urban or rural classification. The fundamental simplifying assumption is based on the premise that many applications will have clear-cut urban/rural designations, i.e., most will be in rural settings that can be definitively characterized through a review of aerial photographs, zoning maps, or U.S. Geological Survey topographical maps.

(B) Based on the TAESH and the urban/rural classification of surrounding land use, use the following table to determine the threshold distance between any stack and the nearest facility boundary.

Terrain adjusted effective stack height range (m)	Distance (m)	
	Urban	Rural
1-9.9	200	200
10-14.9	200	250
15-19.9	200	250
20-24.9	200	350
25-30.9	200	450
31-41.9	200	550
42-52.9	250	800
53-64.9	300	1000
65-112.9	400	1200
113+	700	2500

Record the following information:

Threshold distance from the table (m): ____

Minimum distance from any stack to property boundary (m): ____

If the minimum distance between any stack and the nearest facility boundary is greater than the threshold distance, the surrounding buffer distance is considered significant and the facility is likely to benefit from use of the HWCAQSP relative to the Tier I and II limits (see discussion of benefits from using HWCAQSP in Introduction section).

Step 7: Determine Maximum Dispersion Coefficients

(A) Determine maximum average hourly dispersion coefficients. Based on the results of Step 6(A), select either Table 5.0-4 (urban) or Table 5.0-5 (rural) to determine the maximum average hourly dispersion coefficient.⁷ For flat terrain [defined in Step 5(D)] and for all sites with generic source numbers 1 or 11, use Step 7(A) (1). For rolling or complex terrain (excluding generic sources numbers 1 and 11), use Step 7(A) (2).

(1) Search down the appropriate generic source number column [based on Step 5(C)], beginning at the minimum fenceline distance listed in Step 6(B).⁸ Record the maximum average hourly dispersion coefficient encountered.

Maximum Average Hourly Dispersion Coefficient = _____ ($\mu\text{g}/\text{m}^3/\text{g}/\text{sec}$)

(2) For each of the 3 distance-based generic source numbers listed in Step 5(E), search down the appropriate generic source number columns, beginning at the minimum fenceline distance listed in Step 6(B). Note that different columns may be used for each of the 3 distance ranges if there is a need for terrain adjustment. Record the maximum dispersion coefficient for each generic source number.

⁷ For the distance range 6 to 20 kilometers, generic source number 1 is used to conservatively represent the maximum dispersion coefficient.

⁸ Exclude all distances that are closer to the facility than the property boundary. For example, if the actual distance to the nearest property boundary is 265 meters, begin at the 300 meter distance in Tables 5.0-4 and 5.0-5.

WA-10-05

Distance range (km)	Generic source No. [from Step 5(E)]	Maximum dispersion coefficient ($\mu\text{g}/\text{m}^3/\text{m}/\text{sec}$)
0.0-0.5		
>0.5-2.5		
>2.5-5.0		
>5.0-20.0		

TABLE 5.0-4.—ISCST PREDICTED MAXIMUM CONCENTRATIONS (MG/M³)^a FOR HAZARDOUS WASTE
COMBUSTORS USING URBAN CONDITIONS

Distance (KM)	Generic Source #1 (<10M)	Generic Source #2 (10M)	Generic Source #3 (15M)	Generic Source #4 (20M)	Generic Source #5 (25M)	Generic Source #6 (31M)	Generic Source #7 (42M)	Generic Source #8 (53M)	Generic Source #9 (65M)	Generic Source #10 (113M)	Generic Source #11 (Downwash)
0.20	680.1	517.5	368.7	268.7	168.5	129.8	63.4	30.1	18.4	1.6	662.3
0.25	521.9	418.2	303.7	232.6	163.0	124.2	67.6	38.5	19.8	3.2	500.0
0.30	407.7	351.7	256.2	199.0	147.0	118.3	63.5	41.5	25.0	4.2	389.3
0.35	326.2	304.2	221.6	172.7	130.2	107.9	60.0	40.5	27.3	5.4	311.9
0.40	268.5	268.5	195.6	152.5	115.7	97.1	59.6	37.8	27.4	5.8	268.5
0.45	240.8	240.7	175.4	136.7	103.9	87.6	56.6	37.2	26.3	5.8	240.8
0.50	218.5	218.5	159.2	124.1	94.4	79.7	52.9	36.7	24.7	5.8	218.5
0.55	200.3	200.3	145.9	113.8	86.5	73.1	49.2	35.4	24.5	6.6	200.3
0.60	185.1	185.1	134.9	105.1	80.0	67.6	45.8	33.8	24.3	7.1	185.1
0.65	172.2	172.2	125.5	97.8	74.4	62.9	42.7	32.0	23.7	7.4	172.2
0.70	161.2	161.2	117.4	91.6	69.6	58.9	40.1	30.2	22.9	7.5	161.2
0.75	151.6	151.6	110.5	86.1	65.5	55.4	37.7	28.6	22.0	7.5	151.6
0.80	143.2	143.2	104.4	81.4	61.9	52.3	35.6	27.1	21.1	7.4	143.2
0.85	135.8	135.8	99.0	77.2	58.7	49.6	33.8	25.7	20.2	7.2	135.8
0.90	129.2	129.2	94.2	73.4	55.8	47.2	32.1	24.5	19.3	7.0	129.2
0.95	123.3	123.3	89.9	70.1	53.3	45.0	30.7	23.4	18.5	6.8	123.3
1.00	118.0	118.0	86.0	67.0	51.0	43.1	29.4	22.4	17.7	6.5	118.0
1.10	108.8	108.0	79.3	61.8	47.0	39.7	27.1	20.6	16.4	6.5	108.8
1.20	101.1	101.1	73.7	57.4	43.7	36.9	25.2	19.2	15.2	6.4	101.1
1.30	94.6	94.6	68.9	53.7	40.9	34.5	23.5	18.0	14.2	6.3	94.6
1.40	89.0	89.0	64.8	50.6	38.5	32.5	22.1	16.9	13.4	6.1	89.0
1.50	84.1	84.1	61.3	47.8	36.3	30.7	20.9	16.0	12.7	5.9	84.1
1.60	79.8	79.8	58.2	45.4	34.5	29.2	19.9	15.2	12.0	5.6	79.8
1.70	76.0	76.0	55.4	43.2	32.9	27.8	18.9	14.4	11.4	5.4	76.0
1.80	72.7	72.7	53.0	41.3	31.4	26.5	18.1	13.8	10.9	5.2	72.7
1.90	69.6	69.6	50.7	39.6	30.1	25.4	17.3	13.2	10.5	5.0	69.6
2.00	66.9	66.9	48.8	38.0	28.9	24.4	16.7	12.7	10.1	4.8	66.9
2.25	61.1	61.1	44.5	34.7	26.4	22.3	15.2	11.6	9.2	4.4	61.1
2.50	56.4	56.4	41.1	32.1	24.4	20.6	14.0	10.7	8.5	4.1	56.4
2.75	52.6	52.6	38.3	29.9	22.7	19.2	10.0	10.0	7.9	3.8	52.6
3.00	49.3	49.3	35.9	28.0	21.3	18.0	9.4	9.4	7.4	3.6	49.3
4.00	40.2	40.2	29.3	22.8	17.4	14.7	7.6	7.6	6.1	2.9	40.2
5.00	34.5	34.5	25.2	19.6	14.9	12.6	6.6	6.6	5.2	2.5	34.5
6.00	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7

TABLE 5.0-4.—ISCST PREDICTED MAXIMUM CONCENTRATIONS (MG/M³)^a FOR HAZARDOUS WASTE COMBUSTORS USING URBAN CONDITIONS

Distance (KM)	Generic Source #1 (<10M)	Generic Source #2 (10M)	Generic Source #3 (15M)	Generic Source #4 (20M)	Generic Source #5 (25M)	Generic Source #6 (31M)	Generic Source #7 (42M)	Generic Source #8 (53M)	Generic Source #9 (65M)	Generic Source #10 (113M)	Generic Source #11 (Downwash)
7.00	27.8	27.8	27.8	37.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8
8.00	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
9.00	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
10.00	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3
15.00	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
20.00	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.01	15.0

^a Based on a one Gram/Second Emission Rate

TABLE 5.0-5.—ISCST PREDICTED MAXIMUM CONCENTRATIONS (MG/M³)^a FOR HAZARDOUS WASTE
COMBUSTORS USING RURAL CONDITIONS

Distance (KM)	Generic Source #1 (<10M)	Generic Source #2 (10M)	Generic Source #3 (15M)	Generic Source #4 (20M)	Generic Source #5 (25M)	Generic Source #6 (31M)	Generic Source #7 (42M)	Generic Source #8 (53M)	Generic Source #9 (65M)	Generic Source #10 (113M)	Generic Source #11 (Downwash)
0.20	1771.1	670.3	308.6	176.8	102.8	76.5	28.0	10.1	3.5	0.0	1350.8
0.25	1310.6	678.4	316.9	183.6	104.6	71.8	38.0	17.6	7.9	0.2	1227.3
0.30	1002.3	629.2	303.4	199.1	100.4	75.0	39.7	24.0	12.6	0.8	1119.3
0.35	798.4	569.6	282.3	200.7	117.0	71.1	36.3	25.9	16.8	1.9	1023.8
0.40	656.9	516.5	278.7	194.4	125.2	82.7	25.3	24.6	18.1	3.1	938.9
0.45	621.5	471.1	277.6	184.3	127.5	89.7	35.6	21.7	17.6	4.3	851.8
0.50	633.5	432.4	272.0	172.7	125.7	92.9	34.4	21.6	15.9	5.5	787.8
0.55	630.1	399.2	263.8	168.0	121.6	93.3	38.6	22.1	13.6	6.5	730.6
0.60	616.6	370.4	254.0	169.1	116.2	91.8	42.6	21.7	14.3	6.7	676.4
0.65	596.7	345.4	243.6	168.1	110.3	89.2	45.3	20.9	14.7	6.4	633.4
0.70	573.2	323.4	232.9	165.6	104.5	85.8	47.0	23.3	14.6	5.9	592.0
0.75	546.9	304.0	222.3	162.0	98.8	82.2	47.7	25.5	14.3	5.5	554.6
0.80	520.9	286.8	212.1	157.7	98.8	78.5	47.8	27.1	13.8	5.1	522.1
0.85	495.7	271.5	202.4	153.0	99.0	74.9	47.4	28.3	15.0	4.7	491.8
0.90	471.5	257.8	193.3	148.1	98.6	71.4	46.6	29.1	16.3	4.5	464.2
0.95	448.5	245.4	184.7	143.1	97.6	72.3	45.6	29.6	17.3	4.2	438.9
1.00	426.8	234.2	176.8	138.1	96.3	72.6	44.4	29.8	18.2	4.0	415.8
1.10	387.5	214.7	162.5	128.2	91.9	71.1	41.8	29.5	19.3	3.9	375.0
1.20	353.5	198.4	150.3	119.3	87.4	69.1	39.1	28.6	19.8	4.1	340.3
1.30	323.0	189.6	139.9	111.5	82.9	66.7	36.6	27.5	19.8	4.2	310.4
1.40	296.6	182.2	130.8	104.5	78.7	64.2	34.3	26.2	19.5	4.2	284.6
1.50	273.3	174.6	122.9	98.3	74.7	61.6	32.3	24.9	19.0	4.2	262.0
1.60	252.7	167.0	115.9	92.8	71.0	59.1	31.8	23.6	18.4	4.2	242.2
1.70	234.5	159.6	109.7	87.9	67.6	56.7	31.6	22.5	17.7	4.3	224.7
1.80	218.3	152.4	104.1	83.5	64.4	54.3	31.3	21.4	17.0	4.5	211.9
1.90	203.7	145.6	99.1	79.5	61.5	52.1	30.9	20.4	16.3	4.8	198.4
2.00	190.7	139.1	94.6	75.9	58.8	50.0	30.4	19.5	15.7	5.1	186.3
2.25	164.4	124.5	85.1	68.3	53.0	45.4	28.9	18.1	14.2	5.4	160.8
2.50	143.7	112.1	77.3	62.1	48.2	41.4	27.2	17.9	12.9	5.5	140.7
2.75	127.0	101.5	70.9	56.9	38.1	38.1	25.6	17.5	11.8	5.4	124.5
3.00	113.4	92.4	65.6	52.6	35.2	35.2	24.0	17.0	11.2	5.2	112.5
4.00	78.8	67.3	50.6	40.6	27.2	27.2	29.0	14.3	10.4	4.3	78.3
5.00	59.1	54.6	41.4	33.2	22.2	22.2	15.6	12.0	9.3	3.5	58.8
6.00	56.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7

TABLE 5.0-5.—ISCST PREDICTED MAXIMUM CONCENTRATIONS (MG/M³)^a FOR HAZARDOUS WASTE COMBUSTORS USING RURAL CONDITIONS

Distance (KM)	Generic Source #1 (<10M)	Generic Source #2 (10M)	Generic Source #3 (15M)	Generic Source #4 (20M)	Generic Source #5 (25M)	Generic Source #6 (31M)	Generic Source #7 (42M)	Generic Source #8 (53M)	Generic Source #9 (65M)	Generic Source #10 (113M)	Generic Source #11 (Downwash)
7.00	40.4	40.4	40.4	40.4	40.4	40.4	40.4	40.4	40.4	40.4	40.4
8.00	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
9.00	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2
10.00	9.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
15.00	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
20.00	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9

^a Based on a one Gram/Second Emission Rate

(B) Determine annual/hourly ratio for rural analysis. The maximum average annual dispersion coefficient is approximated by multiplying the maximum hourly dispersion coefficient (identified in Step 7(A)) by the appropriate ratio selection from Table 5.0-6. The generic source number(s) [from Steps 5(C) or 5(E)], urban/rural designation (from Step 6), and the terrain type are used to select the appropriate scaling factor. Use the noncomplex terrain designation for all sources located in flat terrain, for all sources where the physical stack height of the worst-case stack is less than or equal to 10 m, for all sources where the worst-case stack is less than the minimum GEP, and for those sources where all of the TAESH values in Step 5(E) are greater than 0. Use the complex terrain designation in all other situations.

(C) Determine maximum average annual dispersion coefficient. The maximum average annual dispersion coefficient is determined by multiplying the maximum hourly dispersion coefficient (Step 7(A)) by its corresponding annual/hourly ratio (Step 7(B)).

Terrain	Distance from stack (m)	Generic source No.	Maximum hourly dispersion coefficient (µg/m ³ /g/sec)	Annual hourly ratio	Maximum annual dispersion coefficient (µg/m ³ /g/sec) ¹
Flat	0-20.0 0-0.5 ≤ 0.5-2.5				
Rolling or Complex	≤ 2.5-5.0 ≤ 5.0-20.0				

¹ Maximum hourly dispersion coefficient times annual/hourly ratio.

Step 8: Estimate Maximum Ambient Air Concentrations

See procedures prescribed in this subchapter.

Step 9: Determine Compliance with Regulatory Limits

See procedures prescribed in this subchapter.

Step 10: Multiple Stack Method (Optional)

This option is a special case procedure that may be helpful when (1) the facility exceeded the regulatory limits for one or more pollutants, as detailed in Step 9, and (2) the facility has multiple stacks with substantially different emission rates and effective release heights. Only those pollutants that fail the Step 9 screening limits need to be addressed in this exercise.

This procedure assesses the environmental impacts from each stack and then sums the results to estimate total impacts. This option is conceptually the same as the basic approach (Steps 1 through 9) and does not involve complex calculations. However, it is more time-consuming and is recommended only if the basic approach fails to meet the risk criteria. The procedure is outlined below.

(A) Compute effective stack heights for each stack.⁹

Stack No.	GEP stack height (m)	Flow rate (m ³ /sec)	Exit temp (°K)	Plume rise (m)	Effective stack height (m)
1	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____

Add an additional page if more than 3 stacks are involved. Circle the maximum and minimum effective stack heights.

(B) Determine if this multiple-stack screening procedure will likely produce less conservative results than the procedure in Steps 1 through 9. To do this, compute the ratio of maximum-to-minimum effective stack height:

$$\frac{\text{Maximum Effective Stack Height}}{\text{Minimum Effective Stack Height}} = \underline{\hspace{2cm}}$$

If the above ratio is greater than 1.25, proceed with the remaining steps. Otherwise, this option is less likely to significantly reduce the degree of conservatism in the screening method.

(C) Determine if terrain adjustment is needed and select generic source numbers. Select the shortest stack height and maximum terrain rise out to 5 km from Step 1 and determine if the facility is in flat terrain. Shortest stack height (m) = _____ Maximum terrain rise in meters out to 5 km = _____

⁹ Follow the procedure outlined in Step 4 of the basic screening procedure to determine the GEP for each stack. If a stack's physical height exceeds the maximum GEP, use the maximum GEP values. If a stack's physical height is less than the minimum GEP, use generic source number 11 in the subsequent steps of this analysis. Follow the procedure in Steps 5(A) and 5(B) to determine the effective height of each stack.

$$\frac{\text{Terrain Rise (m)}}{\text{Shortest Stack Height (m)}} \times 100 = \text{--- \%}$$

If the value above is greater than 10%, the terrain is considered nonflat; proceed to Step 10(D). If the ratio is less than or equal to 10%, the terrain is considered flat. Identify the generic source numbers based on effective stack heights computed in Step 10(A). Refer to Table 5.0-2 provided earlier to identify generic source numbers. Record the generic source numbers identified and proceed to Step 10(F).

	Stack No.		
	1	2	3
Generic Source Numbers	_____	_____	_____

(D) Compute the TAESH and select generic source numbers (4 sources located in nonflat terrain).

1. Compute the TAESH for all remaining stacks using the following equation:

$$HE - TR = TAESH$$

where:

HE = effective stack height (m)

TR = maximum terrain rise for each distance range (m)

TAESH = terrain-adjusted effective stack height (m)

USE THE TABLE BELOW TO CALCULATE THE TAESH FOR EACH STACK¹⁰

Distance Range (km)	Stack No.														
	0-0.5					>0.5-2.5					>2.5-5.0				
	HE	-	TR	=	TAESH	HE	-	TR	=	TAESH	HE	-	TR	=	TAESH
1	_____	-	_____	=	_____	_____	-	_____	=	_____	_____	-	_____	=	_____
2	_____	-	_____	=	_____	_____	-	_____	=	_____	_____	-	_____	=	_____
3	_____	-	_____	=	_____	_____	-	_____	=	_____	_____	-	_____	=	_____

For those stacks where the terrain rise within a distance range is greater than the effective stack height (i.e., HE-TR is less than 0), the TAESH for that distance range is set equal to 0, and generic source number one should be used for that distance range for *all* subsequent distance ranges. Additionally, for all stacks with a physical stack height of less than or equal to 10 meters, use generic source number one for all distance ranges.¹¹

2. For the remaining stacks, refer to Table 5.0-2 and, for each distance range, identify the generic source number that includes the TAESH. Use the values obtained from Steps 10(D)(1) and 10(D)(2) to complete the following summary worksheet;

¹⁰ Refer to Step 1 for terrain adjustment data. Note that the distance from the source to the outer radii of each range is used. For example, for the range >0.5-2.5 km, the maximum terrain rise in the range 0.0-2.5 km is used.

¹¹ This applies to all stacks less than or equal to 10 meters regardless of the terrain classification.

GENERIC SOURCE NUMBER AFTER TERRAIN ADJUSTED (IF NEEDED)			
Stack No.	0-0.5 km	>0.5-2.5 km	>2.5-5.0 km
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____

(E) Identify maximum average hourly dispersion coefficients. Based on the land use classification of the site (e.g., urban or rural), use either Table 5.0-4 or Table 5.0-5 to determine the appropriate dispersion coefficient for each distance range for each stack. Begin at the minimum fenceline distance indicated in Step 7(B) and record on Worksheet 5.0-1 the dispersion coefficient for each stack/distance range. For stacks located in facilities in flat terrain, the generic source numbers were computed in Step 10(C). For stacks located in facilities in rolling and complex terrain, the generic source numbers were computed in Step 10(D). For flat terrain applications and for stacks with a physical height of less than or equal to 10 meters, only one generic source number is used per stack for all distance ranges. For other situations up to 3 generic source numbers may be needed per stack (i.e., a unique generic source number per distance range). In Tables 5.0-4 and 5.0-5, the dispersion coefficients for distances of 6 km to 20 km are the same for all generic source numbers in order to conservatively represent terrain beyond 5 km (past the limits of the terrain analysis).

Worksheet 5.0-1 Dispersion Coefficient by Downwind Distance¹

Distance	Stack 1	Stack 2	Stack 3
0.20			
0.25			
0.30			
0.35			
0.40			
0.45			
0.50			
0.55			
0.60			
0.65			
0.70			
0.75			
0.80			
0.85			
0.90			
0.95			
1.00			
1.10			
1.20			
1.30			
1.40			
1.50			
1.60			
1.70			
1.80			
1.90			
2.00			
2.25			
2.50			
2.75			
3.00			
4.00			
5.00			
6.00			
7.00			
8.00			
9.00			
10.00			
15.00			
20.00			

¹Note: This procedure places all stacks at the same point, but allows for consideration of different effective stack heights. The distance to the closest boundary (extracted from Step 1) should be the closest distance to any stack.

(F) Estimate maximum hourly ambient air concentrations. In this step, pollutant-specific emission rates are multiplied by appropriate dispersion coefficients to estimate ambient air concentrations. For each stack, emissions are multiplied by the dispersion coefficient selected in Step 10(E) and summed across all stacks to estimate ambient air concentrations at various distances from the facility. From these summed concentrations, the maximum hourly ambient air concentration is selected. First, select the maximum emission rate of the pollutant.¹² Record these data in the spaces provided below.¹³

MAXIMUM ANNUAL EMISSION RATES (G/SEC)

Pollutant	Stack 1	Stack 2	Stack 3

¹² Recall that it is recommended that this analysis be performed for only one or 2 pollutants. The pollutants chosen for this analysis should be those that show the most significant exceedances of the risk threshold.

¹³ Refer to Step 8 of the basic screening procedure. At this point in the screening procedure, annual emissions are used to represent hourly average emission rates. These values will be adjusted by the annual/hourly ratio to estimate annual average concentrations.

WA-10-05

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Complete a separate copy of Worksheet 5.0-2 for each pollutant and select the highest hourly concentration from the summation column at the far right of the worksheet. Record the maximum hourly air concentration for each pollutant analyzed (add additional lines if needed):

Pollutant	Maximum hourly air concentration

Worksheet 5.0-2 Maximum Hourly Ambient Air Concentration

Total Distance (mi)	Pollutant _____			
	Stack 1 ER = DC = C	Stack 2 ER = DC = C	Stack 3 ER = DC = C	Summed Concentration from all stacks
0.25				
0.25				
0.25				
0.25				
0.40				
0.45				
0.50				
0.55				
0.60				
0.65				
0.70				
0.80				
0.85				
0.90				
0.95				
1.00				
1.10				
1.20				
1.30				
1.40				
1.50				

ER= Annual Average Emission Rate
 DC= Hourly Dispersion Coefficient (from Worksheet 5.0-1)
 C= Estimated Maximum Hourly Ambient Air Concentration

Worksheet 5.0-2 Maximum Hourly Ambient Air Concentration

Total Distance (mi.)	Pollutant				Summed Concentration from all Stacks
	Stack 1 $ER \times DC = C$	Stack 2 $ER \times DC = C$	Stack 3 $ER \times DC = C$		
1.40					
1.70					
1.80					
1.90					
2.00					
2.25					
2.50					
2.75					
3.00					
4.00					
5.00					
6.00					
7.00					
8.00					
9.00					
10.00					
15.00					
20.00					

ER=Annual Average Emission Rate
DC= Hourly Dispersion Coefficient (from Worksheet 5.0-1)
C= Estimated Maximum Hourly Ambient Air Concentration

Worksheet 5.0-2 Maximum Ambient Air Concentration

Total Distance (km)	Pollutant			Summed Concentration from all Stacks
	Stack 1 DC = DC = C	Stack 2 DC = DC = C	Stack 3 DC = DC = C	
1.00				
1.70				
1.80				
1.90				
2.00				
2.25				
2.50				
2.75				
3.00				
4.00				
5.00				
6.00				
7.00				
8.00				
9.00				
10.00				
15.00				
20.00				

DC = Annual average emission rate
 DC = Hourly dispersion coefficient (from Worksheet 1)
 C = Estimated maximum hourly ambient air concentration

(G) Determine the complex/noncomplex designation for each stack. For each stack, subtract the maximum terrain rise within 5 km of the site from the physical stack height and designate the stack as either complex or noncomplex. If the stack height minus the maximum terrain rise (within 5 km) is greater than 0 or if the stack is less than 10 meters in physical height, then assign the stack a noncomplex designation. If the stack height minus the maximum terrain rise (within 5 km) is less than or equal to 0, then assign the stack a complex designation.

Perform the following computation for each stack and record the information in the spaces provided. Check in the spaces provided whether the stack designation is complex or noncomplex.

Stack No.	Stack height (m)	Maximum terrain rise (m)			Complex	Noncomplex
1		—	=	(m)		
2		—	=	(m)		
3		—	=	(m)		

(H) Identify annual/hourly ratios. Extract the annual/hourly ratios for each stack by referring to Table 5.0-6. Generic source numbers (from Steps 10(C) or 10(D), urban/rural designation (from Step 6)), and

complex or noncomplex terrain designations (from Step 10(G)) are used to select the appropriate scaling factor needed to convert hourly maximum concentrations to estimates of annual average concentrations.

Complete the following table:¹⁴

Stack No.	Generic source No. steps 10 (C or D)			Annual/hourly ratio (from table 5.0-6)		
	Distance ranges (km)			Distance ranges (km)		
	0–0.5	>0.5–2.5	>2.5–5.0	0–0.5	>0.5–2.5	>2.5–5.0
1 _____	_____	_____	_____	_____	_____	_____
2 _____	_____	_____	_____	_____	_____	_____
3 _____	_____	_____	_____	_____	_____	_____

(I) Select the highest annual/hourly ratio among all of the stacks,¹⁵ and then estimate the maximum annual average ambient air concentrations for each pollutant by completing the following table, where:

C = Maximum total hourly ambient air concentration ($\mu\text{g}/\text{m}^3$) for pollutant "N" from Step 10(F),

C_a = Maximum annual average air concentration for pollutant "N" ($\mu\text{g}/\text{m}^3$),

R = Annual/hourly ratio.

TABLE 5.0-6.—95TH PERCENTILE OF ANNUAL/HOURLY RATIOS

Noncomplex Terrain			Complex Terrain		
Source	Urban	Rural	Source	Urban	Rural
1	0.019	0.014	1	0.020	0.053
2	0.033	0.019	2	0.020	0.053
3	0.031	0.018	3	0.030	0.057
4	0.029	0.017	4	0.051	0.047
5	0.028	0.017	5	0.067	0.039
6	0.028	0.017	6	0.059	0.034
7	0.031	0.015	7	0.036	0.031
8	0.030	0.013	8	0.026	0.024
9	0.029	0.011	9	0.026	0.024
10	0.029	0.008	10	0.017	0.013
11	0.018	0.015	11	0.020	0.053

Pollutant	C_a ($\mu\text{g}/\text{m}^3$)	X	R	=	C_a ($\mu\text{g}/\text{m}^3$)
_____	_____	X	_____	=	_____
_____	_____	X	_____	=	_____

¹⁴ If any stack (excluding generic stack number 1 and 11) in Step 10(D) shows a negative terrain adjusted stack height, use the complex terrain annual/hourly ratios.

¹⁵ As an option, the user can identify the stack with the highest ratio for each distance range (rather than the absolute highest). In this case, extra sheets would be needed to show estimated annual average concentrations from each stack by multiplying emission rate times maximum hourly dispersion coefficient times maximum annual/hourly ratio for applicable distance range. Then sum across all stacks for each downwind distance.

(J) Use the maximum annual average concentrations from Step 10(I) to determine compliance with regulatory requirements.

SECTION 6.0—SIMPLIFIED LAND USE CLASSIFICATION PROCEDURE FOR COMPLIANCE WITH TIER I AND TIER II LIMITS

6.1 Introduction

This section provides a simplified procedure to classify areas in the vicinity of boilers and industrial furnace sites as urban or rural in order to set risk-based emission limits under this subchapter. Urban/rural classification is needed because dispersion rates differ between urban and rural areas and thus, the risk per unit emission rate differs accordingly. The combination of greater surface roughness (more buildings/structures to generate turbulent mixing) and the greater amount of heat released from the surface in an urban area (generates buoyancy-induced mixing) produces greater rates of dispersion. The emission limit tables in the regulation, therefore, distinguish between urban and rural areas.

EPA guidance (EPA 1986)¹, incorporated by reference in s. NR 660.11, provides 2 alternative procedures to determine whether the character of an area is predominantly urban or rural. One procedure is based on land use typing and the other is based on population density. Both procedures require consideration of characteristics within a 3-km radius from a source, in this case the facility stack(s). The land use typing method is preferred because it more directly relates to the surface characteristics that affect dispersion rates. The remainder of this discussion is, therefore, focused on the land use method.

While the land use method is more direct, it can also be labor-intensive to apply. For this discussion, the land use method has been simplified so that it is consistent with EPA guidance (EPA 1986¹; Auer 1978²), incorporated by reference in s. NR 660.11, while streamlining the process for the majority of applications so that a clear-cut decision can be made without the need for detailed analysis. Table 6.0-1 summarizes the simplified approach for classifying areas as urban or rural. As shown, the applicant always has the option of applying standard (i.e., more detailed) analyses to more accurately distinguish between urban and rural areas. However, the procedure presented here allows for simplified determinations, where appropriate, to expedite the permitting process.

TABLE 6.0-1.—CLASSIFICATION OF LAND USE TYPES

Type ¹	Description	Urban or rural designation ²
I1	Heavy Industrial.....	Urban.
I2	Light/Moderate Industrial	Urban.
C1	Commercial.....	Urban.
R1	Common Residential (Normal Easements)....	Rural.
R2	Compact Residential (Single Family).....	Urban.
R3	Compact Residential (Multi-Family).....	Urban.
R4	Estate Residential (Multi-Acre Plots)	Rural.
A1	Metropolitan Natural.....	Rural.
A2	Agricultural.....	Rural.
A3	Undeveloped (Grasses/Weeds)	Rural.
A4	Undeveloped (Heavily Wooded)	Rural.

TABLE 6.0-1.—CLASSIFICATION OF LAND USE TYPES

Type ¹	Description	Urban or rural designation ²
A5	Water Surfaces.....	Rural.

¹ EPA, Guideline on Air Quality Models (Revised), EPA-450/2-78-027R, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July, 1986, incorporated by reference in s. NR 660.11.

² Auer, August H. Jr., "Correlation of Land Use and Cover with Meteorological Anomalies," Journal of Applied Meteorology, pp. 636-643, 1978.

6.2 Simplified Land Use Process

The land use approach considers four primary land use types: industrial (I), commercial (C), residential (R), and agricultural (A). Within these primary classes, subclasses are identified, as shown in table 6.0-1. The goal is to estimate the percentage of the area within a 3-km radius that is urban type and the percentage that is rural type. Industrial and commercial areas are classified as urban; agricultural areas are classified as rural.

The delineation of urban and rural areas, however, can be more difficult for the residential type areas shown in table 6.0-1. The degree of resolution shown in table 6.0-1 for residential areas often cannot be identified without conducting site area inspections and/or referring to zoning maps. This process can require extensive analysis, which, for many applications, can be greatly streamlined without sacrificing confidence in selecting the appropriate urban or rural classification.

The fundamental simplifying assumption is based on the premise that many applications will have clear-cut urban/rural designations, i.e., most will be in rural settings that can be definitively characterized through a brief review of topographical maps. The color coding on USGS topographical maps provides the most effective means of simplifying the typing scheme. The suggested typing designations for the color codes found on topographical maps are as follows:

Green Wooded areas (rural).

White White areas generally will be treated as rural. This code applies to areas that are unwooded and do not have densely packed structures which would require the pink code (house omission tint). Parks, industrial areas, and unforested rural land will appear as white on the topographical maps. Of these categories, only the industrial areas could potentially be classified as urban based on EPA 1986 or Auer 1978 (see footnotes 1 and 2 in Table 6.0-1), incorporated by reference in s. NR 660.11. Industrial areas can be easily identified in most cases by the characteristics shown in Figure 6.0-1. For this simplified procedure, white areas that have an industrial classification will be treated as urban areas.

Figure 6.0-1
Supplementary Publication Symbols

117	Single track Line weight .005". Tie weight .003", length .04", spaced .20" center to center.	
118	Single track abandoned Same as existing track with space .02", dash .16". Label.	
119	Single track under construction Same as existing track with space .02", dash .38". Label UNDER CONSTRUCTION.	
120	Multiple main line track Overall width .017". Line weight .003". Tie length .052", spaced .26" center to center. If more than two tracks label with double cross tie at point of change. Double cross tie .017" overall width.	
121	Multiple track abandoned Same as existing track with space .02", dash .16". Label ABANDONED.	
122	Multiple track under construction Same as existing track with space .02", dash .38". Label UNDER CONSTRUCTION.	
123	Juxtaposition Alternate ties, spaced .20" center to center. Minimum space between tracks .011". Line weight for single track .005", multiple tracks .007".	
124	Railroad in street Ties spaced .20" center to center. Label if narrow gauge. Tie weight .003".	
125	Yards Line weight .003". Space between tracks .011". Ties spaced .20" center to center, maximum length to touch 6 tracks.	
126	Sidings Line weight .003". Scribe to scale with minimum space between tracks .011". Ties spaced .20" center to center, length .54" for single track.	
127	Large buildings Outline weight .003". When width exceeds .06", hatch at 45° angle to building in NE direction. Lines .002" spaced .02" center to center.	
128	Sewage disposal or filtration plant Line weight .003". See symbol 700 for blue hatching. Label.	
196	Tanks: oil, gas, water, etc. Circle .03" minimum, .10" maximum. Label as to contents.	
197	Tanks: oil, gas, water, etc. Exceeding 1/2" diameter. Outline weight .003". Hatch SW-NE with .002" lines spaced .02" center to center. Label as to contents.	

SECTION 7.0—STATISTICAL METHODOLOGY FOR BEVILL RESIDUE DETERMINATIONS

This section describes the statistical comparison of waste-derived residue to normal residue for use in determining eligibility for the Bevill exemption under s. NR 666.112.

7.1 Comparison of Waste-Derived Residue to Normal Residue

To be eligible for the Bevill exclusion from the definition of hazardous waste under s. NR 666.112(2)(a), waste-derived residue may not contain ch. NR 661, Appendix VIII, constituents that could reasonably be attributable to the hazardous waste (toxic constituents) at concentrations significantly higher than in residue generated without burning or processing hazardous waste (normal residue). Concentrations of toxic constituents in normal residue are determined based on analysis of a minimum of 10 samples representing a minimum of 10 days of operation. The statistically-derived concentrations in

normal residue are determined as the upper tolerance limit (95% confidence with a 95% proportion of the sample distribution) of the normal residue concentrations. The upper tolerance limit is to be determined as described in Section 7.2 below. If changes in raw materials or fuels could lower the statistically-derived concentrations of toxic constituents of concern, the statistically-derived baseline shall be re-established for any such mode of operation with the new raw material or fuel.

Concentrations of toxic constituents in waste-derived residue are determined based on the analysis of one or more samples collected over a compositing period of not more than 24 hours. Multiple samples of the waste-derived residue may be analyzed or subsamples may be composited for analysis, if the sampling period does not exceed 24 hours. If more than one sample is analyzed to characterize the waste-derived residue generated over a 24-hour period, the arithmetic mean of the concentrations shall be used as the waste-derived concentration for each constituent.

The concentration of a toxic constituent in the waste-derived residue is not considered to be significantly higher than in the normal residue (i.e., the residue passes the Bevill test for that constituent) if the concentration in the waste-derived residue does not exceed the statistically-derived concentration.

7.2 Calculation of the Upper Tolerance Limit

The 95% confidence with 95% proportion of the sample distribution (upper tolerance limit) is calculated for a set of values assuming that the values are normally distributed. The upper tolerance limit is a one-sided calculation and is an appropriate statistical test for cases in which a single value (the waste-derived residue concentration) is compared to the distribution of a range of values (the minimum of 10 measurements of normal residue concentrations). The upper tolerance limit value is determined as follows:

$$UTL = X + (K)(S)$$

where X = mean of the normal residue concentrations, $X = X_i/n$,

K = coefficient for sample size n , 95% confidence and 95% proportion,

S = standard deviation of the normal residue concentrations,

$S = (\sum(X_i - X)^2 / (n - 1))^{0.5}$, and

n = sample size.

The values of K at the 95% confidence and 95% proportion, and sample size n are given in Table 7.0-1.

For example, a normal residue test results in 10 samples with the following analytical results for toxic constituent A:

Sample No.	Concentration of constituent A (ppm)
1	10
2	10
3	15
4	10
5	7
6	12
7	10
8	16

Sample No.	Concentration of constituent A (ppm)
9	15
10	10

The mean and the standard deviation of these measurements, calculated using the above equations, are 11.5 and 2.9, respectively. Assuming that the values are normally distributed, the upper tolerance limit (UTL) is given by:

$$UTL = 11.5 + (2.911)(2.9) = 19.9 \text{ ppm}$$

Thus, if the concentration of constituent A in the waste-derived residue is below 19.9 ppm, then the waste-derived residue is eligible for the Bevill exclusion for constituent A.

7.3 Normal Distribution Assumption

As noted in Section 7.2 above, this statistical approach (use of the upper tolerance limit) for calculation of the concentration in normal residue is based on the assumption that the concentration data are distributed normally. The department is aware that concentration data of this type may not always be distributed normally, particularly when concentrations are near the detection limits. There are a number of procedures that can be used to test the distribution of a data set. For example, the Shapiro-Wilk test, examination of a histogram or plot of the data on normal probability paper, and examination of the coefficient of skewness are methods that may be applicable, depending on the nature of the data (References 1 and 2).

If the concentration data are not adequately represented by a normal distribution, the data may be transformed to attain a near normal distribution. The department has found that concentration data, especially when near detection levels, often exhibit a lognormal distribution. The assumption of a lognormal distribution has been used in various programs at EPA, such as in the Office of Solid Waste Land Disposal Restrictions program for determination of BDAT treatment standards. The transformed data may be tested for normality using the procedures identified above. If the transformed data are better represented by a normal distribution than the untransformed data, the transformed data should be used in determining the upper tolerance limit using the procedures in Section 7.2 above.

In all cases where the owner or operator wishes to use other than an assumption of normally distributed data or believes that use of an alternate statistical approach is appropriate to the specific data set, the owner or operator shall provide supporting rationale in the operating record that demonstrates that the data treatment is based upon sound statistical practice.

7.4 Nondetect Values

The department is developing guidance regarding the treatment of nondetect values (data where the concentration of the constituent being measured is below the lowest concentration for which the analytical method is valid) in carrying out the statistical determination described above. Until the guidance information is available, facilities may present their own approach to the handling of nondetect data points, but shall provide supporting rationale in the operating record for consideration by the department.

TABLE 7.0-1.—K VALUES FOR 95%
CONFIDENCE AND 95% PROPORTION

Sample size (n)	K
10	2.911
11	2.815
12	2.736
13	2.670
14	2.614
15	2.566
16	2.523
17	2.486
18	2.458
19	2.423
20	2.396
21	2.371
22	2.350
23	2.329
24	2.303
25	2.292

7.5 References

1. Shapiro, S.S. and Wilk, M.B. (1965), "An Analysis of Variance Test for Normality (complete samples)," *Biometrika*, 52,591-611.
2. Bhattacharyya, G.K. and R.A. Johnson (1977), *Statistical Concepts and Methods*, John Wiley and Sons, New York.

SECTION 8.0—PROCEDURES FOR DETERMINING DEFAULT VALUES FOR AIR POLLUTION CONTROL SYSTEM REMOVAL EFFICIENCIES

During interim license, owners or operators of boilers and industrial furnaces burning hazardous waste shall submit documentation to the department that certifies that emissions of HCl, Cl₂, metals, and particulate matter (PM) are not likely to exceed allowable emission rates. See certification of precompliance under s. NR 666.103(2). This documentation also establishes interim license feed rate and operating limits for the facility. For the initial certification, estimates of emissions and system removal efficiencies (SREs) can be made to establish the operating limits. Subsequently, owners or operators shall use emissions testing to demonstrate that emissions do not exceed allowable levels, and to establish operating limits (see s. NR 666.103(3)). However, initial estimates of emissions for certification of precompliance can be based on estimated or established SREs.

The SRE combines the effect of partitioning of the chlorine, metals, or PM and the air pollution control system removal efficiency (APCS RE) for these pollutants. The SRE is defined as:

$$\text{SRE} = (\text{species input} - \text{species emitted}) / \text{species input}$$

The SRE can be calculated from the partitioning factor (PF) and APCS RE by the following formula:

$$\text{SRE} = 1 - [(\text{PF}/100) \times (1 - \text{APCS RE}/100)]$$

where:

PF = percentage of the pollutant partitioned to the combustion gas

Estimates of the PF and/or the APCS RE can be based on either EPA's default values or engineering judgement. EPA's 'default values for the APCS RE for metals, HCl, Cl₂, and PM are described in this section. EPA's default values for partitioning of these pollutants are described in section 9.0.

Guidelines for the use of engineering judgement to estimate APCS REs or PFs are described in section 9.4.

8.1 APCS RE Default Values for Metals

EPA's default assumptions for APCS RE for metals are shown in Table 8.1-1. The default values in the table are conservative estimates of the removal efficiencies for metals in BIFs, depending on the volatility of the metal and the type of APCS.

The volatility of a metal depends on the temperature, the thermal input, the chlorine content of the waste, and the identity and concentration of the metal. Metals that do not vaporize at combustion zone temperatures are classified as "nonvolatile". Such metals typically enter the APCS in the form of large particles that are removed relatively easily. Metals that vaporize in the combustion zone and condense before entering the APCS are classified as "volatile". Such metals typically enter the APCS in the form of very fine, submicron particles that are rather inefficiently removed in many APCSs. Metals that vaporize in the combustion zone and do not condense before entering the APCS are classified as "very volatile". Such metals enter the APCS in the form of a vapor that is very inefficiently removed in many APCSs.

Typically, BIFs have combustion zone temperatures high enough to vaporize any hazardous metal at concentrations sufficient to exceed risk-based emission limits. For this reason, the default assumption is that there are no nonvolatile metals. Tables 8.1-2 and 8.1-3 are used to determine whether metals are classified as "volatile" or "very volatile" depending on the temperature entering the APCS, the thermal input, and whether the waste is chlorinated or nonchlorinated.

TABLE 8.1-1.—AIR POLLUTION CONTROL SYSTEMS (APCS) AND THEIR
CONSERVATIVELY ESTIMATED EFFICIENCIES FOR CONTROLLING TOXIC
METALS (%)

APCS	Metal Volatility		
	Nonvolatile	Volatile	Very Volatile
WS	40	30	20
VS-20	80	75	20
VS-60	87	75	40
ESP-1	90	75	0
ESP-2	92	80	0
ESP-4	95	80	0
WESP	90	85	40
FF	90	80	0
SD/FF	97	90	0
DS/FF	95	90	0

IWS	90	87	75
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WS = Wet Scrubber including: Sieve Tray Tower, Packed Tower, Bubble Cap Tower

VS-20 = Venturi Scrubber, ca. 20-30 in W.G. Δp

VS-60 = Venturi Scrubber, ca. >60 in W.G. Δp

ESP-1 = Electrostatic Precipitator; 1 stage

ESP-2 = Electrostatic Precipitator; 2 stage

ESP-4 = Electrostatic Precipitator; 4 stage

IWS = Ionizing Wet Scrubber

DS = Dry Scrubber

FF = Fabric Filter (Baghouse)

SD = Spray Dryer (Wet/Dry Scrubber)

WESP = Wet Electrostatic Precipitator

TABLE 8.1-2.—TEMPERATURE (F) ENTERING APCS ABOVE WHICH METALS ARE CLASSIFIED AS VERY VOLATILE IN COMBUSTION OF NONCHLORINATED WASTES

Metal		Thermal Input (MMBtu/hr) ¹				
Name	Symbol	1	10	100	1000	10000
Arsenic	As	320	280	240	200	160
Cadmium	Cd	1040	940	860	780	720
Chromium	Cr	2000	1760	1580	1420	1380
Beryllium	Be	1680	1440	1240	1080	980
Antimony	Sb	680	600	540	480	420
Barium	Ba	2240	1820	1540	1360	1240
Lead	Pb	1280	1180	1080	1000	920
Mercury	Hg	340	300	260	220	180
Silver	Ag	1820	1640	1480	1340	1220
Thallium	Tl	900	800	700	620	540

¹ Interpolation of thermal input is not allowed. If a BIF fires between 2 ranges, the APCS temperature under the higher thermal input shall be used. *Example:* For a BIF firing 10-100 MMBtu/hr, Mercury is considered very volatile at APCS temperatures above 260 F and volatile at APCS temperatures of 260 F and below.

TABLE 8.1-3.—TEMPERATURE (F) ENTERING APCS ABOVE WHICH METALS ARE CLASSIFIED AS VERY VOLATILE IN COMBUSTION OF CHLORINATED WASTES

Metal		Thermal Input (MMBtu/hr) ¹				
Name	Symbol	1	10	100	1000	10000
Arsenic	As	320	280	240	200	160
Cadmium	Cd	1040	940	860	780	720
Chromium	Cr	>140	>140	>140	>140	>140
Beryllium	Be	1680	1440	1240	1080	980
Antimony	Sb	680	600	540	480	420
Barium	Ba	2060	1840	1680	1540	1420
Lead	Pb	>140	>140	>140	>140	>140
Mercury	Hg	340	300	260	220	180

TABLE 8.1-3.—TEMPERATURE (F) ENTERING APCS ABOVE WHICH METALS ARE CLASSIFIED AS VERY VOLATILE IN COMBUSTION OF CHLORINATED WASTES

Metal		Thermal Input (MMBtu/hr) ¹				
Name	Symbol	1	10	100	1000	10000
Silver	Ag	1080	940	840	740	660
Thallium	Tl	900	800	700	620	540

¹ Interpolation of thermal input is not allowed. If a BIF fires between two ranges, the APCS temperature under the higher thermal input shall be used. *Example:* For a BIF firing 10-100 MMBtu/hr, Mercury is considered very volatile at APCS temperatures above 260 F and volatile at APCS temperatures of 260 F and below.

A waste is considered chlorinated if chlorine is present in concentrations greater than 0.1% by weight. In the EPA guidance document "Guidance for Metals and Hydrogen Chloride Controls for Hazardous Waste Incinerators, Volume IV of the Hazardous Waste Incineration Guidance Series," (1) one percent is used for the chlorinated/nonchlorinated cutoff. However, best engineering judgement, based on examination of pilot-scale data reported by Carroll et al. (2) on the effects of waste chlorine content on metals emissions, suggests that the one percent cutoff may not be sufficiently conservative.

Tables 8.1-2 and 8.1-3 were compiled based on equilibrium calculations. Metals are classified as very volatile at all temperatures above the temperature at which the vapor pressure of the metal is greater than 10% of the vapor pressure that results in emissions exceeding the most conservative risk-based emissions limits.

8.2 APCS RE Default Values for HCl and Cl₂

Default assumptions for APCS RE for HCl in BIFs are shown in Table 8.2-1. This table is identical to the column for other BIFs except that cement kilns have a minimum HCl removal efficiency of 83%. Because of the alkaline nature of the raw materials in cement kilns, most of the chlorine is converted to chloride salts. Thus, the minimum APCS RE for HCl for cement kilns is independent of the APCS train.

Removal efficiency of Cl₂ for most types of APCS is generally minimal. Therefore, the default assumption for APCS RE for Cl₂ for all APCSs is 0%. This is applicable to all BIFs, including cement kilns.

8.3 APCS RE Default Values for Ash

Default assumptions for APCS RE for PM are also shown in Table 8.1-4. These figures are conservative estimates of PM removal efficiencies for different types of APCSs. They are identical to the figures in the Nonvolatile APCS RE column for hazardous metals presented in Table 8.1-1 because the same collection mechanisms and collection efficiencies that apply to nonvolatile metals also apply to PM.

TABLE 8.2-1.—AIR POLLUTION CONTROL SYSTEMS (APCS) AND THEIR CONSERVATIVELY ESTIMATED EFFICIENCIES FOR REMOVING HYDROGEN CHLORIDE (HCl) AND PARTICULATE MATTER (PM) (%)

APCD	HCl
------	-----

	Cement kilns	Other BIFs	PM
WS	97	97	40
VS-20	97	97	80
VS-60	98	98	87
ESP-1	83	0	90
ESP-2	83	0	92
ESP-4	83	0	95
WESP	83	70	90
FF	83	0	90
SD/FF	98	98	97
DS/FF	98	98	95
WS/IWS	99	99	95
IWS	99	99	90

WS = Wet Scrubber including: Sieve Tray Tower, Packed Tower, Bubble Cap Tower

PS = Proprietary Wet Scrubber Design (A number of proprietary wet scrubbers have come on the market in recent years that are highly efficient on both particulates and corrosive gases. Two such units are offered by Calvert Environmental Equipment Co. and by Hydro-Sonic Systems, Inc.).

VS-20 = Venturi Scrubber, ca. 20-30 in W.G. Δp

VS-60 = Venturi Scrubber, ca. >60 in W.G. Δp

ESP-1 = Electrostatic Precipitator; 1 stage

ESP-2 = Electrostatic Precipitator; 2 stage

ESP-4 = Electrostatic Precipitator; 4 stage

IWS = Ionizing Wet Scrubber

DS = Dry Scrubber

FF = Fabric Filter (Baghouse)

SD = Spray Dryer (Wet/Dry Scrubber)

8.4 References

1. U.S. Environmental Protection Agency. "Guidance on Metals and Hydrogen Chloride Controls for Hazardous Waste Incinerators," Office of Solid Waste, Washington, DC, August 1989.

2. Carroll, G.J., R.C. Thurnau, R.E. Maurnighan, L.R. Waterland, J.W. Lee, and D.J. Fournier. The Partitioning of Metals in Rotary Kiln Incineration. Proceedings of the Third International Conference on New Frontiers for Hazardous Waste Management. NTIS Document No. EPA/600/9-89/072, p. 555 (1989).

SECTION 9.0—PROCEDURES FOR DETERMINING DEFAULT VALUES FOR PARTITIONING OF METALS, ASH, AND TOTAL CHLORIDE/CHLORINE

Pollutant partitioning factor estimates can come from 2 sources: default assumptions or engineering judgement. The department's default assumptions are discussed below for metals, HCl_2 , Cl, and PM. The default assumptions are used to conservatively predict the partitioning factor for several types of BIFs. Engineering judgement-based partitioning factor estimates are discussed in section 9.4.

9.1 Partitioning Default Value for Metals

To be conservative, the department is assuming that 100% of each metal in each feed stream is partitioned to the combustion gas. Owners/operators may use this default value or a supportable, site-specific value developed following the general guidelines provided in section 9.4.

9.2 Special Procedures for Chlorine, HCl, and Cl₂

The department has established the special procedures presented below for chlorine because the emission limits are based on the pollutants HCl and Cl₂ formed from chlorine fed to the combustor. Therefore, the owner/operator shall estimate the controlled emission rate of both HCl and Cl₂ and show that they do not exceed allowable levels.

1. The default partitioning value for the fraction of chlorine in the total feed streams that is partitioned to combustion gas is 100%. Owners/operators may use this default value or a supportable, site-specific value developed following the general guidelines provided in section 9.4.

2. To determine the partitioning of chlorine in the combustion gas to HCl versus Cl₂, either use the default values below or use supportable site-specific values developed following the general guidelines provided in section 9.4.

- For BIFs excluding halogen acid furnaces (HAFs), with a total feed stream chlorine/hydrogen ratio ≤ 0.95 , the default partitioning factor is 20% Cl₂, 80% HCl.
- For HAFs and for BIFs with a total feed stream chlorine/hydrogen ratio > 0.95 , the default partitioning factor is 100% Cl₂.

3. To determine the uncontrolled (i.e., prior to acid gas APCS) emission rate of HCl and Cl₂, multiply the feed rate of chlorine times the partitioning factor for each pollutant. Then, for HCl, convert the chlorine emission rate to HCl by multiplying it by the ratio of the molecular weight of HCl to the molecular weight of Cl (i.e., 36.5/35.5). No conversion is needed for Cl₂.

9.3 Special Procedures for Ash

This section: (1) Explains why ash feed rate limits are not applicable to cement and light-weight aggregate kilns; (2) presents the default partitioning values for ash; and (3) explains how to convert the 0.08 gr/dscf, corrected to 7% O₂, PM emission limit to a PM emission rate.

Waiver for Cement and Light-Weight Aggregate Kilns. For cement kilns and light-weight aggregate kilns, raw material feed streams contain the vast majority of the ash input, and a significant amount of the ash in the feed stream is entrained into the kiln exhaust gas. For these devices, the ash content of the hazardous waste stream is expected to have a negligible effect on total ash emissions. For this reason, there is no ash feed rate compliance limit for cement kilns or light-weight aggregate kilns. Nonetheless, cement kilns and light-weight aggregate kilns are required to initially certify that PM emissions are not likely to exceed the PM limit, and subsequently, certify through compliance testing that the PM limit is not exceeded.

Default Partitioning Value for Ash. The default assumption for partitioning of ash depends on the feed stream firing system. There are 2 methods by which materials may be fired into BIFs: Suspension-firing and bed-firing.

The suspension category includes atomized and lanced pumpable liquids and suspension-fired pulverized solids. The default partitioning assumption for materials fired by these systems is that 100% of the ash partitions to the combustion gas.

The bed-fired category consists principally of stoker boilers and raw materials (and in some cases containerized hazardous waste) fed into cement and light-weight aggregate kilns. The default partitioning assumption for materials fired on a bed is that 5% of the ash partitions to the combustion gas.

Converting the PM Concentration-Based Standard to a PM Mass Emission Rate. The emission limit for BIFs is 0.08 gr/dscf, corrected to 7% O₂, unless a more stringent standard applies [e.g., a New Source Performance Standard (NSPS) or a State standard implemented under the State Implementation Plan (SIP)]. To convert the 0.08 gr/dscf standard to a PM mass emission rate:

1. Determine the flue gas O₂ concentration (% by volume, dry) and flue gas flow rate (dry standard cubic feet per minute); and
2. Calculate the allowable PM mass emission rate by multiplying the concentration-based PM emission standard times the flue gas flow rate times a dilution correction factor equal to $[(21 - \text{O}_2 \text{ concentration from step 1}) / (21 - 7)]$.

9.4 Use of Engineering Judgement To Estimate Partitioning and APCS RE Values

Engineering judgement may be used in place of the department's conservative default assumptions to estimate partitioning and APCS RE values if the engineering judgement is defensible and properly documented. To properly document engineering judgement, the owner/operator shall keep a written record of all assumptions and calculations necessary to justify the APCS RE used. The owner/operator shall provide this record to the department upon request and shall be prepared to defend the assumptions and calculations used.

If the engineering judgement is based on emissions testing, the testing will often document the emission rate of a pollutant relative to the feed rate of that pollutant rather than the partitioning factor or APCS RE.

Examples of situations where the use of engineering judgement may be supportable to estimate a partitioning factor, APCS RE, or SRE include:

- Using emissions testing data from the facility to support an SRE, even though the testing may not meet full QA/QC procedures (e.g., triplicate test runs). The closer the test results conform with full QA/QC procedures and the closer the operating conditions during the test conform with the established operating conditions for the facility, the more supportable the engineering judgement will be.
- Applying emissions testing data documenting an SRE for one metal, including nonhazardous surrogate metals to another less volatile metal.
- Applying emissions testing data documenting an SRE from one facility to a similar facility.
- Using APCS vendor guarantees of removal efficiency.

9.5 Restrictions on Use of Test Data

The measurement of an SRE or an APCS RE may be limited by the detection limits of the measurement technique. If the emission of a pollutant is undetectable, then the calculation of SRE or APCS RE should be based on the lower limit of detectability. An SRE or APCS RE of 100% is not acceptable.

Further, mass balance data of facility inputs, emissions, and products/residues may not be used to support a partitioning factor, given the inherent uncertainties of such procedures. Partitioning factors other than the default values may be supported based on engineering judgement, considering, for example, process chemistry. Emissions test data may be used to support an engineering judgement-based SRE, which includes both partitioning and APCS RE.

9.5 References

1. Barton, R.G., W.D. Clark, and W.R. Seeker. (1990) "Fate of Metals in Waste Combustion Systems". Combustion Science and Technology. 74, 1-6, p. 327

SECTION 10.0—ALTERNATIVE METHODOLOGY FOR IMPLEMENTING METALS CONTROLS

10.1 Applicability

This method for controlling metals emissions applies to cement kilns and other industrial furnaces operating under interim license that recycle emission control residue back into the furnace.

10.2 Introduction

Under this method, cement kilns and other industrial furnaces that recycle emission control residue back into the furnace shall comply with a kiln dust concentration limit (i.e., a collected particulate matter (PM) limit) for each metal, as well as limits on the maximum feedrates of each of the metals in: (1) pumpable hazardous waste; and (2) all hazardous waste.

The following subsections describe how this method for controlling metals emissions is to be implemented:

- Subsection 10.3 discusses the basis of the method and the assumptions upon which it is founded;
- Subsection 10.4 provides an overview of the implementation of the method;
- Subsection 10.5 is a step-by-step procedure for implementation of the method;
- Subsection 10.6 describes the compliance procedures for this method; and
- Appendix A describes the statistical calculations and tests to be used in the method.

10.3 Basis

The viability of this method depends on 3 fundamental assumptions:

(1) Variations in the ratio of the metal concentration in the emitted particulate to the metal concentration in the collected kiln dust (referred to as the enrichment factor or EF) for any given metal at any given facility will fall within a normal distribution that can be experimentally determined.

(2) The metal concentrations in the collected kiln dust can be accurately and representatively measured (using procedures specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, incorporated by reference in s. NR 660.11).

(3) The facility will remain in compliance with the applicable particulate matter (PM) emission standard.

Given these assumptions, metal emissions can be related to the measured concentrations in the collected kiln dust by the following equation:

$$ME \left(\frac{1b \text{ Emitted Metal}}{hr} \right) = PME \left(\frac{1b \text{ PM}}{hr} \right) DMC \left(\frac{1b \text{ Dust Metal}}{1b \text{ Dust}} \right) EF \left(\frac{1b \text{ Emitted Metal} / 1b \text{ PM}}{1b \text{ Dust Metal} / 1b \text{ Dust}} \right) \quad (1)$$

Where:

ME is the metal emitted;

PME is the particulate matter emitted;

DMC is the metal concentration in the collected kiln dust; and

EF is the enrichment factor, which is the ratio of the metal concentration in the emitted particulate matter to the metal concentration in the collected kiln dust.

This equation can be rearranged to calculate a maximum allowable dust metal concentration limit (DMCL) by assuming worst-case conditions that: metal emissions are at the Tier III (or Tier II) limit (see s. NR 666.106), and that particulate emissions are at the particulate matter limit (PML):

$$DMCL \left(\frac{1b \text{ Dust Metal}}{1b \text{ Dust}} \right) = \frac{\text{Tier III Limit} \left(\frac{1b \text{ Emitted Metal}}{hr} \right)}{PML \left(\frac{1b \text{ PM}}{hr} \right) EF \left(\frac{1b \text{ Emitted Metal} / 1b \text{ PM}}{1b \text{ Dust Metal} / 1b \text{ Dust}} \right)} \quad (2)$$

The enrichment factor used in the above equation shall be determined experimentally from a minimum of 10 tests in which metal concentrations are measured in kiln dust and stack samples taken simultaneously. This approach provides a range of enrichment factors that can be inserted into a statistical distribution (t-distribution) to determine EF_{95%} and EF_{99%}. EF_{95%} is the value at which there is a 95% confidence level that the enrichment factor is below this value at any given time. Similarly, EF_{99%} is the value at which there is a 99% confidence level that the enrichment factor is below this value at any given time. EF_{95%} is used to calculate the "violation" dust metal concentration limit (DMCL_v):

$$DMCL_v \left(\frac{1b \text{ Dust Metal}}{1b \text{ Dust}} \right) = \frac{\text{Tier III Limit} \left(\frac{1b \text{ Emitted Metal}}{hr} \right)}{PML \left(\frac{1b \text{ PM}}{hr} \right) EF_{95\%} \left(\frac{1b \text{ Emitted Metal} / 1b \text{ PM}}{1b \text{ Dust Metal} / 1b \text{ Dust}} \right)} \quad (3)$$

If the kiln dust metal concentration is just above this "violation" limit, and the PM emissions are at the PM emissions limit, there is a 5% chance that the metal emissions are above the Tier III limit. In such a case, the facility would be in violation of the metals standard.

To provide a margin of safety, a second, more conservative kiln dust metal concentration limit is also used. This "conservative" dust metal concentration limit (DMCL_c) is calculated using a "safe" enrichment factor (SEF). If EF_{99%} is greater than two times the value of EF_{95%}, the "safe" enrichment factor can be calculated using Equation 4a:

$$SEF \geq 2 EF_{95\%} \quad (4a)Q02$$

If EF_{99%} is not greater than two times the value of EF_{95%}, the "safe" enrichment factor can be calculated using Equation 4b:

$$SEF \geq EF_{99\%} \quad (4b)$$

In cases where the enrichment factor cannot be determined because the kiln dust metal concentration is nondetectable, the "safe" enrichment factor is as follows:

$$SEF = 100 \quad (4c)$$

For all cases, the "conservative" dust metal concentration limit is calculated using the following equation:

$$DMCL_c \left(\frac{1b \text{ Dust Metal}}{1b \text{ Dust}} \right) = \frac{\text{Tier III Limit} \left(\frac{1b \text{ Emitted Metal}}{hr} \right)}{PML \left(\frac{1b \text{ PM}}{hr} \right) SEF \left(\frac{1b \text{ Emitted Metal} / 1b \text{ PM}}{1b \text{ Dust Metal} / 1b \text{ Dust}} \right)} \quad (5)$$

If the kiln dust metal concentration at a facility is just above the "conservative" limit based on that "safe" enrichment factor provided in Equation 4a, and the PM emissions are at the PM emissions limit, there is a 5% chance that the metal emissions are above one-half the Tier III limit. If the kiln dust metal concentration at the facility is just above the "conservative" limit based on the "safe" enrichment factor provided in Equation 4b, and the PM emissions are at the PM emissions limit, there is a 1% chance that the metal emissions are above the Tier III limit. In either case, the facility would be unacceptably close to a violation. If this situation occurs more than 5% of the time, the facility would be required to rerun the series of 10 tests to determine the enrichment factor. To avoid this expense, the facility would be advised to reduce its metals feedrates or to take other appropriate measures to maintain its kiln dust metal concentrations in compliance with the "conservative" dust metal concentration limits.

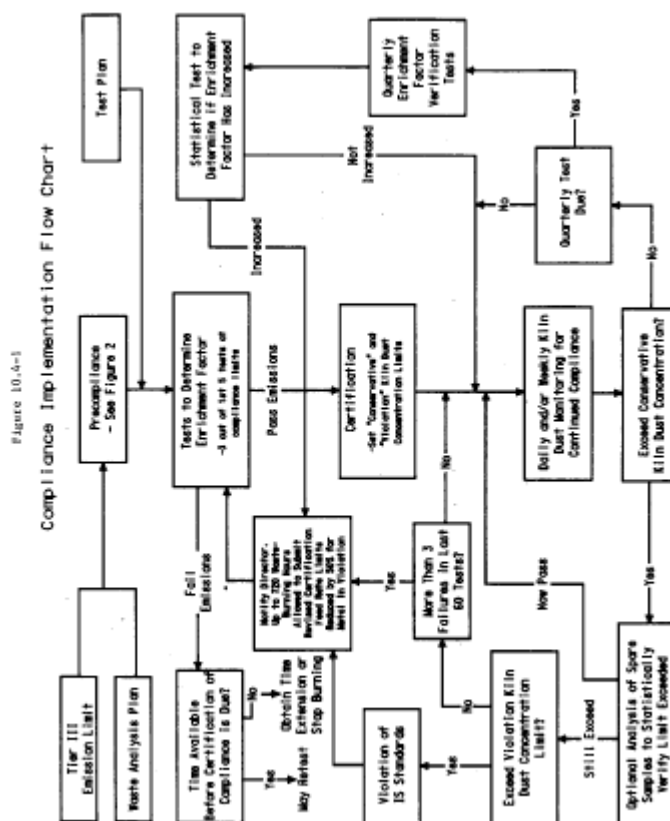
In cases where the enrichment factor cannot be determined because the kiln dust metal concentration is nondetectable, and thus no $EF_{95\%}$ exists, the "violation" dust metal concentration limit is set at 10 times the "conservative" limit:

$$DMCL_v = 10 \times DMCL_c \quad (6)$$

10.4 Overview

The flowchart for implementing the method is shown in Figure 10.4-1. The general procedure is as follows:

- Follow the certification of precompliance procedures described in subsection 10.6 (to comply with s. NR 666.103(2)).
- For each metal of concern, perform a series of tests to establish the relationship (enrichment factor) between the concentration of emitted metal and the metal concentration in the collected kiln dust.
- Use the demonstrated enrichment factor, in combination with the Tier III (or Tier II) metal emission limit and the most stringent applicable particulate emission limit, to calculate the "violation" and "conservative" dust metal concentration limits. Include this information with the certification of compliance under s. NR 666.103(3).



- Perform daily and/or weekly monitoring of the cement kiln dust metal concentration to ensure (with appropriate QA/QC) that the metal concentration does not exceed either limit.
- If the cement kiln dust metal concentration exceeds the "conservative" limit more than 5% of the time (i.e., more than 3 failures in last 60 tests), the series of tests to determine the enrichment factor shall be repeated.
- If the cement kiln dust metal concentration exceeds the "violation" limit, a violation has occurred.
 - Perform quarterly tests to verify that the enrichment factor has not increased significantly. If the enrichment factor has increased, the series of tests to determine the enrichment factor shall be repeated.

10.5 Implementation Procedures

A step-by-step description for implementing the method is provided below:

(1) Prepare initial limits and test plans.

- Determine the Tier III metal emission limit. The Tier II metal emission limit may also be used (see s. NR 666.106).
- Determine the applicable PM emission standard. This standard is the most stringent particulate emission standard that applies to the facility. A facility may elect to restrict itself to an even more stringent self-imposed PM emission standard, particularly if the facility finds that it is easier to control particulate emissions than to reduce the kiln dust concentration of a certain metal (i.e., lead).
- Determine which metals need to be monitored (i.e., all hazardous metals for which Tier III emission limits are lower than PM emission limits—assuming PM is pure metal).

- Follow the compliance procedures described in Subsection 10.6.
- Follow the guidelines described in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in s. NR 660.11, for preparing test plans and waste analysis plans for the following tests:
 - Compliance tests to determine limits on metal feedrates in pumpable hazardous wastes and in all hazardous wastes (as well as to determine other compliance parameters);
 - Initial tests to determine enrichment factors;
 - Quarterly tests to verify enrichment factors;
 - Analysis of hazardous waste feedstreams; and
 - Daily and/or weekly monitoring of kiln dust for continuing compliance.
- (2) Conduct tests to determine the enrichment factor.
 - These tests shall be conducted within a 14-day period. No more than 2 tests may be conducted in any single day. If the tests are not completed within a 14-day period, they shall be repeated.
 - Simultaneous stack samples and kiln dust samples shall be taken.
- Stack sampling shall be conducted with the multiple metals train according to procedures provided in section 10.3 of this Methods Manual.
- Kiln dust sampling shall be conducted as follows:
 - Follow the sampling and analytical procedures described in SW-846 and the waste analysis plan as they pertain to the condition and accessibility of the dust.
 - Samples should be representative of the last ESP or Fabric Filter in the APCS series.
 - The feedrates of hazardous metals in all pumpable hazardous waste streams and in all hazardous waste streams shall be monitored during these tests. It is recommended (but not required) that the feedrates of hazardous metals in all feedstreams also be monitored.
 - At least 10 single (noncomposited) runs are required during the tests.
- The facility shall follow a normal schedule of kiln dust recharging for all of the tests.
- Three of the first 5 tests shall be compliance tests in conformance with s. NR 666.103(3); i.e., they shall be used to determine maximum allowable feedrates of metals in pumpable hazardous wastes. and in all hazardous wastes, as well as to determine other compliance limits (see s. NR 666.103(3)(a)).
- The remainder of the tests need not be conducted under full compliance test conditions; however, the facility shall operate at its compliance test production rate, and it shall burn hazardous waste during these tests such that the feedrate of each metal for pumpable and total hazardous wastes is at least 25% of the feedrate during compliance testing. If these criteria, and those discussed below, are not met for any parameter during a test, then either the test is not valid for determining enrichment factors under this method, or the compliance limits for that parameter shall be established based on these test conditions rather than on the compliance test conditions.
 - Verify that compliance emission limits are not exceeded.
- Metal emissions may not exceed Tier III (or Tier II) limits.
- PM emissions may not exceed the most stringent of applicable PM standards (or an optional self-imposed particulate standard).
 - The facility shall generate normal, marketable product using normal raw materials and fuels under normal operating conditions (for parameters other than those specified under this method) when these tests are conducted.
 - Chromium shall be treated as a special case:

- The enrichment factor for total chromium is calculated in the same way as the enrichment factor for other metals (i.e., the enrichment factor is the ratio of the concentration of total chromium in the emitted particulate matter to the concentration of total chromium in the collected kiln dust).
- The enrichment factor for hexavalent chromium (if measured) is defined as the ratio of the concentration of hexavalent chromium in the emitted particulate matter to the concentration of total chromium in the collected kiln dust.

(3) Use the enrichment factors measured in Step 2 to determine $EF_{95\%}$, $EF_{99\%}$, and SEF.

- Calculate $EF_{95\%}$ and $EF_{99\%}$ according to the t-distribution as described in Appendix A
- Calculate SEF by
 - Equation 4a if $EF_{95\%}$ is determinable and if $EF_{99\%}$ is greater than 2 times $EF_{95\%}$,
 - Equation 4b if $EF_{95\%}$ is determinable and if $EF_{99\%}$ is not greater than 2 times $EF_{95\%}$,
 - Equation 4c if $EF_{95\%}$ is not determinable.

The facility may choose to set an even more conservative SEF to give itself a larger margin of safety between the point where corrective action is necessary and the point where a violation occurs.

(4) Prepare certification of compliance.

- Calculate the "conservative" dust metal concentration limit ($DMCL_c$) using Equation 5.
 - Chromium is treated as a special case. The "conservative" kiln dust chromium concentration limit is set for total chromium, not for hexavalent chromium. The limit for total chromium shall be calculated using the Tier III (or Tier II) metal limit for hexavalent chromium.
 - If the stack samples described in Step 2 were analyzed for hexavalent chromium, the SEF based on the hexavalent chromium enrichment factors (as defined in Step 2) shall be used in this calculation.
 - If the stack samples were not analyzed for hexavalent chromium, then the SEF based on the total chromium enrichment factor shall be used in this calculation.
- Calculate the "violation" dust metal concentration limit ($DMCL_v$) using Equation 3 if $EF_{95\%}$ is determinable, or using Equation 6 if $EF_{95\%}$ is not determinable.
 - Chromium is treated as a special case. The "violation" kiln dust chromium concentration limit is set for total chromium, not for hexavalent chromium. The limit for total chromium shall be calculated using the Tier III (or Tier II) metal limit for hexavalent chromium.
 - If the stack samples taken in Step 2 were analyzed for hexavalent chromium, the $EF_{95\%}$ based on the hexavalent chromium enrichment factor (as defined in Step 2) should be used in this calculation.
 - If the stack samples were not analyzed for hexavalent chromium, the $EF_{95\%}$ based on the total chromium enrichment factor shall be used in this calculation.
- Submit certification of compliance.
- Steps 2-4 shall be repeated for recertification, which is required once every 3 years (see s. NR 666.103(4)).

(5) Monitor metal concentrations in kiln dust for continuing compliance, and maintain compliance with all compliance limits for the duration of interim license.

- Metals to be monitored during compliance testing are classified as either "critical" or "noncritical" metals.
 - All metals shall initially be classified as "critical" metals and be monitored on a daily basis.
 - A "critical" metal may be reclassified as a "noncritical" metal if its concentration in the kiln dust remains below 10% of its "conservative" kiln dust metal concentration limit for 30 consecutive daily samples. "Noncritical" metals shall be monitored on a weekly basis.

- A "noncritical" metal shall be reclassified as a "critical" metal if its concentration in the kiln dust is above 10% of its "conservative" kiln dust metal concentration limit for any single daily or weekly sample.
 - Noncompliance with the sampling and analysis schedule prescribed by this method is a violation of the metals controls under s. NR 666.103.
 - Follow the sampling, compositing, and analytical procedures described in this method and in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in s. NR 660.11, as they pertain to the condition and accessibility of the kiln dust.
 - Follow the same procedures and sample at the same locations as were used for kiln dust samples collected to determine the enrichment factors (as discussed in Step 2).
 - Samples shall be collected at least once every 8 hours, and a daily composite shall be prepared according to SW-846 procedures.
 - At least one composite sample is required. This sample is referred to as the "required" sample.
 - For QA/QC purposes, a facility may elect to collect 2 or more additional samples. These samples are referred to as the "spare" samples. These additional samples shall be collected over the same time period and according to the same procedures as those used for the "required" sample.
 - Samples for "critical" metals shall be daily composites.
 - Samples for "noncritical" metals shall be weekly composites. These samples can be composites of the original 8-hour samples, or they can be composites of daily composite samples.
 - Analyze the "required" sample to determine the concentration of each metal.
 - This analysis shall be completed within 48 hours of the close of the sampling period. Failure to meet this schedule is a violation of the metals standards of s. NR 666.103.
 - If the "conservative" kiln dust metal concentration limit is exceeded for any metal, refer to Step 8.
 - If the "conservative" kiln dust metal concentration limit is not exceeded, continue with the daily or weekly monitoring (Step 5) for the duration of interim license.
 - Conduct quarterly enrichment factor verification tests, as described in Step 6.
- (6) Conduct quarterly enrichment factor verification tests.
 - After certification of compliance with the metals standards, a facility shall conduct quarterly enrichment factor verification tests every 3 months for the duration of interim license. The first quarterly test shall be completed within 3 months of certification (or recertification). Each subsequent quarterly test shall be completed within 3 months of the preceding quarterly test. Failure to meet this schedule is a violation.
 - Simultaneous stack samples and kiln dust samples shall be collected.
 - Follow the same procedures and sample at the same locations as were used for kiln dust samples and stack samples collected to determine the enrichment factors (as discussed in Step 2).
 - At least 3 single (noncomposited) runs are required. These tests need not be conducted under the operating conditions of the initial compliance test; however, the facility shall operate under the following conditions:
 - It shall operate at compliance test production rate.
 - It shall burn hazardous waste during the test, and for the 2-day period immediately preceding the test, such that the feedrate of each metal for pumpable and total hazardous wastes consist of at least 25% of the operating limits established during the compliance test.
 - It shall remain in compliance with all compliance parameters (see s. NR 666.103(3)(a)).

- It shall follow a normal schedule of kiln dust recharging.
 - It shall generate normal marketable product from normal raw materials during the tests.
- (7) Conduct a statistical test to determine if the enrichment factors measured in the quarterly verification tests have increased significantly from the enrichment factors determined in the tests conducted in Step 2. The enrichment factors have increased significantly if all 3 of the following criteria are met:

- By applying the t-test described in Appendix A, it is determined that the enrichment factors measured in the quarterly tests are not taken from the same population as the enrichment factors measured in the Step 2 tests;
- The $EF_{95\%}$ calculated for the combined data sets (i.e., the quarterly test data and the original Step 2 test data) according to the t-distribution (described in Appendix A) is more than 10% higher than the $EF_{95\%}$ based on the enrichment factors previously measured in Step 2; and
- The highest measured kiln dust metal concentration recorded in the previous quarter is more than 10% of the "violation" kiln dust concentration limit that would be calculated from the combined $EF_{95\%}$.

If the enrichment factors have increased significantly, the tests to determine the enrichment factors shall be repeated (refer to Step 11). If the enrichment factors have not increased significantly, continue to use the kiln dust metal concentration limits based on the enrichment factors previously measured in Step 2, and continue with the daily and/or weekly monitoring described in Step 5.

(8) If the "conservative" kiln dust metal concentration limit was exceeded for any metal in any single analysis of the "required" kiln dust sample, the "spare" samples corresponding to the same period may be analyzed to determine if the exceedance was due to a sampling or analysis error.

- If no "spare" samples were taken, refer to Step 9.
- If the average of all the samples for a given day (or week, as applicable) (including the "required" sample and the "spare" samples) does not exceed the "conservative" kiln dust metal concentration limit, no corrective measures are necessary; continue with the daily and/or weekly monitoring as described in Step 5.
- If the average of all the samples for a given day (or week, as applicable) exceeds the "conservative" kiln dust metal concentration limit, but the average of the "spare" samples is below the "conservative" kiln dust metal concentration limit, apply the Q-test, described in Appendix A, to determine whether the "required" sample concentration can be judged as an outlier.
 - If the "required" sample concentration is judged an outlier, no corrective measures are necessary; continue with the daily and/or weekly monitoring described in Step 5.
 - If the "required" sample concentration is not judged an outlier, refer to Step 9.

(9) Determine if the "violation" kiln dust metal concentration has been exceeded based on either the average of all the samples collected during the 24-hour period in question, or if discarding an outlier can be statistically justified by the Q-test described in Appendix A, on the average of the remaining samples.

- If the "violation" kiln dust metal concentration limit has been exceeded, a violation of the metals controls under s. NR 666.103(3) has occurred. Notify the department that a violation has occurred. Hazardous waste may be burned for testing purposes for up to 720 operating hours to support a revised certification of compliance. Note that the department may grant an extension of the hours of hazardous waste burning under s. NR 666.103(3)(g) if additional burning time is needed to support a revised certification for reasons beyond the control of the owner or operator. Until a revised certification of compliance is submitted to the department, the feedrate of the metals in violation in total and pumpable hazardous waste feeds is limited to 50% of the previous compliance test limits.

- If the "violation" kiln dust metal concentration has not been exceeded:
 - If the exceedance occurred in a daily composite sample, refer to Step 10.

- If the exceedance occurred in a weekly composite sample, refer to Step 11.
- (10) Determine if the "conservative" kiln dust metal concentration limit has been exceeded more than 3 times in the last 60 days.
 - If not, log this exceedance and continue with the daily and/or weekly monitoring (Step 5).
 - If so, the tests to determine the enrichment factors shall be repeated (refer to Step 11).
 - This determination is made separately for each metal. For example,
 - Three exceedances for each of the 10 hazardous metals are allowed within any 60-day period.
 - Four exceedances of any single metal in any 60-day period is not allowed.
 - This determination should be made daily, beginning on the first day of daily monitoring. For example, if 4 exceedances of any single metal occur in the first 4 days of daily monitoring, do not wait until the end of the 60-day period; refer immediately to Step 11.
- (11) The tests to determine the enrichment factor shall be repeated if: (1) More than 3 exceedances of the "conservative" kiln dust metal concentration limit occur within any 60 consecutive daily samples; (2) an excursion of the "conservative" kiln dust metal concentration limit occurs in any weekly sample; or (3) a quarterly test indicates that the enrichment factors have increased significantly.
 - The facility shall notify the department if these tests shall be repeated.
 - The facility has up to 720 hazardous-waste-burning hours to redetermine the enrichment factors for the metal or metals in question and to recertify (beginning with a return to Step 2). During this period, the facility shall reduce the feed rate of the metal in violation by 50%. If the facility has not completed the recertification process within this period, it shall stop burning or obtain an extension. Hazardous waste burning may resume only when the recertification process (ending with Step 4) has been completed.
 - Meanwhile, the facility shall continue with daily kiln dust metals monitoring (Step 5) and shall remain in compliance with the "violation" kiln dust metal concentration limits (Step 9).

10.6 Precompliance Procedures

Cement kilns and other industrial furnaces that recycle emission control residue back into the furnace shall comply with the same certification schedules and procedures (with the few exceptions described below) that apply to other boilers and industrial furnaces. These schedules and procedures, as set forth in s. NR 666.103, require no later than the effective date of the rule, each facility submit a certification which establishes precompliance limits for a number of compliance parameters (see s. NR 666.103(2)(c)), and that each facility immediately begin to operate under these limits.

These precompliance limits shall ensure that interim license emissions limits for hazardous metals, particulate matter, HCl, and Cl₂ are not likely to be exceeded. Determination of the values of the precompliance limits shall be made based on either (1) conservative default assumptions provided in this Methods Manual, or (2) engineering judgement.

The flowchart for implementing the precompliance procedures is shown in Figure 10.6-1. The step-by-step precompliance implementation procedure is described below. The precompliance implementation procedures and numbering scheme are similar to those used for the compliance procedures described in Subsection 10.5.

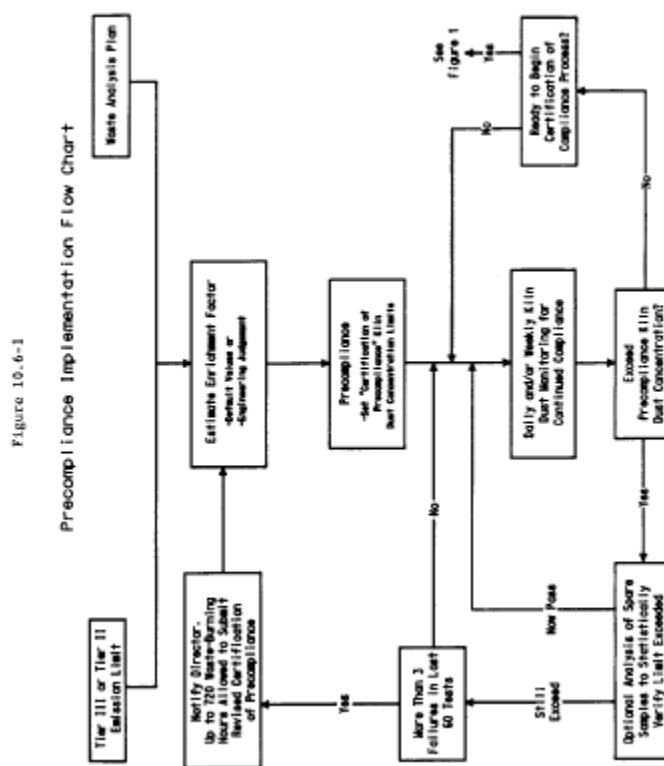
(1) Prepare initial limits and test plans.

- Determine the Tier III metal emission limit. The Tier II metal emission limit may also be used (see s. NR 666.106).
- Determine the applicable PM emission standard. This standard is the most stringent particulate emission standard that applies to the facility. A facility may elect to restrict itself to an even more stringent self-imposed PM emission standard, particularly if the facility finds that it is easier to control particulate emissions than to reduce the kiln dust concentration of a certain metal (i.e., lead).

- Determine which metals need to be monitored (i.e., all hazardous metals for which Tier III emission limits are lower than PM emission limits, assuming PM is pure metal).
- Follow the procedures described in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in s. NR 660.11, for preparing waste analysis plans for the following tasks:

- Analysis of hazardous waste feedstreams.
- Daily and/or weekly monitoring of kiln dust concentrations for continuing compliance.

(2) Determine the "safe" enrichment factor for precompliance. In this context, the "safe" enrichment factor is a conservatively high estimate of the enrichment factor (the ratio of the emitted metal concentration to the metal concentration in the collected kiln dust). The "safe" enrichment factor shall be calculated from either conservative default values, or engineering judgement.



- Conservative default values for the "safe" enrichment factor are as follows:
 - SEF = 10 for all hazardous metals except mercury. SEF=10 for antimony, arsenic, barium, beryllium, cadmium, chromium, lead, silver, and thallium.
 - SEF = 100 for mercury.
- Engineering judgement may be used in place of conservative default assumptions if the engineering judgement is defensible and properly documented. The facility shall keep a written record of all assumptions and calculations necessary to justify the SEF. The facility shall provide this record to the department upon request and shall be prepared to defend these assumptions and calculations. Examples of situations where the use of engineering judgement is appropriate include:
 - Use of data from precompliance tests;
 - Use of data from previous compliance tests; and

- Use of data from similar facilities.
- (3) This step does not apply to precompliance procedures.
- (4) Prepare certification of precompliance.
 - Calculate the "conservative" dust metal concentration limit ($DMCL_c$) using Equation 5.
 - Submit certification of precompliance. This certification shall include precompliance limits for all compliance parameters that apply to other boilers and industrial furnaces (i.e., those that do not recycle emission control residue back into the furnace) as listed in s. NR 666.103(2)(c), except that it is not necessary to set precompliance limits on maximum feedrate of each hazardous metal in all combined feedstreams.
 - Furnaces that recycle collected PM back into the furnace (and that elect to comply with this method (see s. NR 666.103(3)(c)2.) are subject to a special precompliance parameter, however. They shall establish precompliance limits on the maximum concentration of each hazardous metal in collected kiln dust (which shall be set according to the procedures described above).
- (5) Monitor metal concentration in kiln dust for continuing compliance, and maintain compliance with all precompliance limits until certification of compliance has been submitted.
 - Metals to be monitored during precompliance testing are classified as either "critical" or "noncritical" metals.
 - All metals shall initially be classified as "critical" metals and be monitored on a daily basis.
 - A "critical" metal may be reclassified as a "noncritical" metal if its concentration in the kiln dust remains below 10% of its "conservative" kiln dust metal concentration limit for 30 consecutive daily samples. "Noncritical" metals shall be monitored on a weekly basis, at a minimum.
 - A "noncritical" metal shall be reclassified as a "critical" metal if its concentration in the kiln dust is above 10% of its "conservative" kiln dust metal concentration limit for any single daily or weekly sample.
 - It is a violation if the facility fails to analyze the kiln dust for any "critical" metal on any single day or for any "noncritical" metal during any single week, when hazardous waste is burned.
 - Follow the sampling, compositing, and analytical procedures described in this method and in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, incorporated by reference in s. NR 660.11, as they pertain to the condition and accessibility of the kiln dust.
 - Samples shall be collected at least once every 8 hours, and a daily composite prepared according to SW-846 procedures.
 - At least one composite sample is required. This sample is referred to as the "required" sample.
 - For QA/QC purposes, a facility may elect to collect 2 or more additional samples. These samples are referred to as the "spare" samples. These additional samples shall be collected over the same time period and according to the same procedures as those used for the "required" sample.
 - Samples for "critical" metals shall be daily composites.
 - Samples for "noncritical" metals shall be weekly composites, at a minimum. These samples can be composites of the original 8-hour samples, or they can be composites of daily composite samples.
 - Analyze the "required" sample to determine the concentration of each metal.
 - This analysis shall be completed within 48 hours of the close of the sampling period. Failure to meet this schedule is a violation.
 - If the "conservative" kiln dust metal concentration limit is exceeded for any metal, refer to Step 8.
 - If the "conservative" kiln dust metal concentration limit is not exceeded, continue with the daily and/or weekly monitoring (Step 5) for the duration of interim license.

(6) This step does not apply to precompliance procedures.

(7) This step does not apply to precompliance procedures.

(8) If the "conservative" kiln dust metal concentration limit was exceeded for any metal in any single analysis of the "required" kiln dust sample, the "spare" samples corresponding to the same period may be analyzed to determine if the exceedance is due to a sampling or analysis error.

- If no "spare" samples were taken, refer to Step 9.

- If the average of all the samples for a given day (or week, as applicable) (including the "required" sample and the "spare" samples) does not exceed the "conservative" kiln dust metal concentration limit, no corrective measures are necessary; continue with the daily and/or weekly monitoring as described in Step 5.

- If the average of all the samples for a given day (or week, as applicable) exceeds the "conservative" kiln dust metal concentration limit, but the average of the "spare" samples is below the "conservative" kiln dust metal concentration limit, apply the Q-test, described in Appendix A, to determine whether the "required" sample concentration can be judged as an outlier.

- If the "required" sample concentration is judged an outlier, no corrective measures are necessary; continue with the daily and/or weekly monitoring described in Step 5.

- If the "required" sample concentration is not judged an outlier, refer to Step 10.

(9) This step does not apply to precompliance procedures.

(10) Determine if the "conservative" kiln dust metal concentration limit has been exceeded more than 3 times in the last 60 days.

- If not, log this exceedance and continue with the daily and/or weekly monitoring (Step 5).

- If so, the tests to determine the enrichment factors shall be repeated (refer to Step 11).

- This determination is made separately for each metal; for example:

- Three exceedances for each of the 10 hazardous metals are allowed within any 60-day period.

- Four exceedances of any single metal in any 60-day period is not allowed.

- This determination should be made daily, beginning on the first day of daily monitoring. For example, if 4 exceedances of any single metal occur in the first 4 days of daily monitoring, do not wait until the end of the 60-day period; refer immediately to Step 11.

(11) A revised certification of precompliance shall be submitted to the department (or certification of compliance shall be submitted) if: (1) More than 3 exceedances of the "conservative" kiln dust metal concentration limit occur within any 60 consecutive daily samples; or (2) an exceedance of the "conservative" kiln dust metal concentration limit occurs in any weekly sample.

- The facility shall notify the department if a revised certification of precompliance shall be submitted.

- The facility has up to 720 waste-burning hours to submit a certification of compliance or a revised certification of precompliance. During this period, the feed rate of the metal in violation shall be reduced by 50%. In the case of a revised certification of precompliance, engineering judgement shall be used to ensure that the "conservative" kiln dust metal concentration will not be exceeded. Examples of how this goal might be accomplished include:

- Changing equipment or operating procedures to reduce the kiln dust metal concentration;

- Changing equipment or operating procedures, or using more detailed engineering judgement, to decrease the estimated SEF and thus increase the "conservative" kiln dust metal concentration limit;

- Increasing the "conservative" kiln dust metal concentration limit by imposing a stricter PM emissions standard; or

- Increasing the "conservative" kiln dust metal concentration limit by performing a more detailed risk assessment to increase the metal emission limits.

- Meanwhile, the facility shall continue with daily kiln dust metals monitoring (Step 5).

APPENDIX A TO APPENDIX IX—STATISTICS

A.1 *Determination of Enrichment Factor*

After at least 10 initial emissions tests are performed, an enrichment factor for each metal shall be determined. At the 95% confidence level, the enrichment factor, $EF_{95\%}$, is based on the test results and is statistically determined so there is only a 5% chance that the enrichment factor at any given time will be larger than $EF_{95\%}$. Similarly, at the 99% confidence level, the enrichment factor, $EF_{99\%}$, is statistically determined so there is only a 1% chance that the enrichment factor at any given time will be larger than $EF_{99\%}$.

For a large number of samples ($n > 30$), $EF_{95\%}$ is based on a normal distribution, and is equal to:

$$EF_{95\%} = EF + z_c \sigma \quad (1)$$

where:

$$\overline{EF} = \frac{\sum_{i=1}^n EF_i}{n} \quad (2)$$

$$\sigma = \left[\frac{\sum_{i=1}^n (EF_i - \overline{EF})^2}{n} \right]^{\frac{1}{2}} \quad (3)$$

For a 95% confidence level, z_c is equal to 1.645.

For a small number of samples ($n < 30$), $EF_{95\%}$ is based on the t-distribution and is equal to:

$$EF_{95\%} = EF + t_c S \quad (4)$$

where the standard deviation, S , is defined as:

$$S = \left[\frac{\sum_{i=1}^n (EF_i - \overline{EF})^2}{n - 1} \right]^{\frac{1}{2}} \quad (5)$$

t_c is a function of the number of samples and the confidence level that is desired. It increases in value as the sample size decreases and the confidence level increases. The 95% confidence level is used in this method to calculate the "violation" kiln dust metal concentration limit; and the 99% confidence level is sometimes used to calculate the "conservative" kiln dust metal concentration limit. Values of t_c are shown in table A-1 for various degrees of freedom (degrees of freedom = sample size-1) at the 95% and 99% confidence levels. As the sample size approaches infinity, the normal distribution is approached.

A.2 Comparison of Enrichment Factor Groups

To determine if the enrichment factors measured in the quarterly tests are significantly different from the enrichment factors determined in the initial Step 2 tests, the t-test is used. In this test, the value t_{meas} :

$$t_{\text{meas}} = \frac{\overline{EF}_1 - \overline{EF}_2}{\sigma_t \left(\frac{1}{n_1} + \frac{1}{n_2} \right)^{\frac{1}{2}}} \quad (6)$$

TABLE A-1.— T-DISTRIBUTION

n-1 or $n_1 + n_2 - 2$	$t_{.95}$	$t_{.99}$
1	6.31	31.82
2	2.92	6.96
3	2.35	4.54
4	2.13	3.75
5	2.02	3.36
6	1.94	3.14
7	1.90	3.00
8	1.86	2.90
9	1.83	2.82
10	1.81	2.76
11	1.80	2.72
12	1.78	2.68
13	1.77	2.65
14	1.76	2.62
15	1.75	2.60
16	1.75	2.58
17	1.74	2.57
18	1.73	2.55
19	1.73	2.54
20	1.72	2.53
25	1.71	2.48
30	1.70	2.46
40	1.68	2.42
60	1.67	2.39
120	1.66	2.36
∞	1.645	2.33

$$\sigma_t = \left(\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2} \right)^{\frac{1}{2}} \quad (7)$$

is compared to t_{crit} at the desired confidence level. The 95% confidence level is used in this method. Values of t_{crit} are shown in table A-1 for various degrees of freedom (degrees of freedom n_1+n_2-2) at the 95% and 99% confidence levels. If t_{meas} is greater than t_{crit} , it can be concluded with 95% confidence that the 2 groups are not from the same population.

A.3 Rejection of Data

If the concentration of any hazardous metal in the "required" kiln dust sample exceeds the kiln dust metal concentration limit, the "spare" samples are analyzed. If the average of the combined "required" and "spare" values is still above the limit, a statistical test is used to decide if the upper value can be rejected.

The "Q-test" is used to determine if a data point can be rejected. The difference between the questionable result and its neighbor is divided by the spread of the entire data set. The resulting ratio, Q_{meas} , is then compared with rejection values that are critical for a particular degree of confidence, where Q_{meas} is:

$$Q_{meas} = \frac{DMC_{next\ highest} - DMC_{next\ lowest}}{DMC_{highest} - DMC_{lowest}} \quad (8)$$

The 90% confidence level for data rejection is used in this method. Table A-2 provides the values of Q_{crit} at the 90% confidence level. If Q_{meas} is larger than Q_{crit} , the data point can be discarded. Only one data point from a sample group can be rejected using this method.

TABLE A-2.-CRITICAL VALUES
FOR USE IN THE Q-TEST

n	Q_{crit}
3	0.94
4	0.76
5	0.64
6	0.56
7	0.51
8	0.47
9	0.44
10	0.41

LEAD-BEARING MATERIALS THAT MAY BE PROCESSED IN EXEMPT LEAD SMELTERS

A. Exempt Lead-Bearing Materials When Generated or Originally Produced By Lead-Associated Industries¹⁶

Acid dump/fill solids
Sump mud
Materials from laboratory analyses
Acid filters
Baghouse bags
Clothing (e.g., coveralls, aprons, shoes, hats, gloves)
Sweepings
Air filter bags and cartridges
Respiratory cartridge filters
Shop abrasives
Stacking boards
Waste shipping containers (e.g., cartons, bags, drums, cardboard)
Paper hand towels
Wiping rags and sponges
Contaminated pallets
Water treatment sludges, filter cakes, residues, and solids
Emission control dusts, sludges, filter cakes, residues, and solids from lead-associated industries (e.g., K069 and D008 wastes)
Spent grids, posts, and separators
Spent batteries
Lead oxide and lead oxide residues
Lead plates and groups
Spent battery cases, covers, and vents
Pasting belts
Water filter media
Cheesecloth from pasting rollers
Pasting additive bags
Asphalt paving materials

B. Exempt Lead-Bearing Materials When Generated or Originally Produced By Any Industry

Charging jumpers and clips
Platen abrasive
Fluff from lead wire and cable casings
Lead-based pigments and compounding pigment dust

¹⁶ Lead-associated industries are lead smelters, lead-acid battery manufacturing, and lead chemical manufacturing (e.g., manufacturing of lead oxide or other lead compounds).

Chapter NR 666

APPENDIX XII

**NICKEL OR CHROMIUM-BEARING MATERIALS THAT MAY BE PROCESSED IN
EXEMPT NICKEL-CHROMIUM RECOVERY FURNACES**

A. Exempt Nickel or Chromium-Bearing Materials when Generated by Manufacturers or Users of Nickel, Chromium, or Iron

Baghouse bags
Raney nickel catalyst
Floor sweepings
Air filters
Electroplating bath filters
Wastewater filter media
Wood pallets
Disposable clothing (coveralls, aprons, hats, and gloves)
Laboratory samples and spent chemicals
Shipping containers and plastic liners from containers or vehicles used to transport nickel or chromium-containing wastes
Respirator cartridge filters
Paper hand towels

B. Exempt Nickel or Chromium-Bearing Materials when Generated by Any Industry

Electroplating wastewater treatment sludges (F006)
Nickel and/or chromium-containing solutions
Nickel, chromium, and iron catalysts
Nickel-cadmium and nickel-iron batteries
Filter cake from wet scrubber system water treatment plants in the specialty steel industry¹⁷
Filter cake from nickel-chromium alloy pickling operations¹

Chapter NR 666

APPENDIX XIII

**MERCURY BEARING WASTES THAT MAY BE PROCESSED IN EXEMPT MERCURY RECOVERY
UNITS**

These are exempt mercury-bearing materials with less than 500 ppm of ch. NR 661, Appendix VIII organic constituents when generated by manufacturers or users of mercury or mercury products.

1. Activated carbon
2. Decomposer graphite
3. Wood
4. Paper
5. Protective clothing
6. Sweepings
7. Respiratory cartridge filters
8. Cleanup articles
9. Plastic bags and other contaminated containers

¹⁷ If a hazardous waste under an authorized state program.

10. Laboratory and process control samples
11. K106 and other wastewater treatment plant sludge and filter cake
12. Mercury cell sump and tank sludge
13. Mercury cell process solids
14. Recoverable levels or mercury contained in soil

Chapter NR 666

STANDARDS FOR MANAGING SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subchapter M —Military Munitions

NR 666.200	Applicability.
NR 666.201	Definitions.
NR 666.202	Definition of solid waste.
NR 666.203	Standards applicable to the transportation of solid waste military munitions.
NR 666.204	Standards applicable to emergency responses.
NR 666.205	Standards applicable to the storage of solid waste military munitions.
NR 666.206	Standards applicable to the treatment and disposal of waste military munitions.

Subchapter M —Military Munitions

NR 666.200 Applicability. (1) This subchapter identifies when military munitions become a solid waste, and, if these wastes are also hazardous under this subchapter or ch. NR 661, the management standards that apply to these wastes.

(2) Unless otherwise specified in this subchapter, all applicable requirements in chs. NR 660 to 670 apply to waste military munitions.

Note: This subchapter is based on federal regulations contained in 40 CFR part 266 subpart M, revised as of July 1, 2002.

NR 666.201 Definitions. In addition to the definitions in s. NR 660.10, the following definitions apply to this subchapter:

(1) “Active range” means a military range that is currently in service and is being regularly used for range activities.

(2) “Chemical agent and munition” means an agent or munition that, through its chemical properties, produces lethal or other damaging effects on human beings, except that the term does not include riot control agents, chemical herbicides, smoke and other obscuration materials.

(3) “DDESB” means the United States department of defense explosives safety board.

(4) “Inactive range” means a military range that is not currently being used, but that is still under military control and considered by the military to be a potential range area, and that has not been put to a new use that is incompatible with range activities.

(5) “Military” means the U.S. department of defense (DOD), U.S. armed services, U.S. coast guard, national guard, U.S. department of energy (DOE), or other parties under contract or acting as an agent for any of them, who handle military munitions.

(6) “Military range” means designated land and water areas set aside, managed and used to conduct research on, develop, test and evaluate military munitions and explosives, other ordnance

or weapon systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas and buffer zones with restricted access and exclusionary areas.

(7) “Unexploded ordnance” or “UXO” means military munitions that have been primed, fused, armed or otherwise prepared for action, and have been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installation, personnel or material and remain unexploded either by malfunction, design or any other cause.

NR 666.202 Definition of solid waste. (1) A military munition is not a solid waste when either of the following occurs:

(a) It is used for its intended purpose, including any of the following:

1. Use in training military personnel or explosives and munitions emergency response specialists (including training in proper destruction of unused propellant or other munitions).
2. Use in research, development, testing and evaluation of military munitions, weapons or weapon systems.
3. Recovery, collection and on-range destruction of unexploded ordnance and munitions fragments during range clearance activities at active or inactive ranges. However, "use for intended purpose" does not include the on-range disposal or burial of unexploded ordnance and contaminants when the burial is not a result of product use.

(b) It is an unused munition, or component thereof, which is being repaired, reused, recycled, reclaimed, disassembled, reconfigured or otherwise subjected to materials recovery activities, unless the activities involve use constituting disposal as defined in s. NR 661.02(3)(a), or burning for energy recovery as defined in s. NR 661.02(3)(b).

(2) An unused military munition is a solid waste when any of the following occurs:

- (a) The munition is abandoned by being disposed of, burned, detonated (except during intended use as specified in sub. (1)), incinerated or treated prior to disposal.
- (b) The munition is removed from storage in a military magazine or other storage area for the purpose of being disposed of, burned, incinerated or treated prior to disposal.
- (c) The munition is deteriorated or damaged (e.g., the integrity of the munition is compromised by cracks, leaks or other damage) to the point that it cannot be put into serviceable condition, and cannot reasonably be recycled or used for other purposes.
- (d) The munition has been declared a solid waste by an authorized military official.

(3) A used or fired military munition is a solid waste when either of the following occurs:

- (a) When it is transported off range or from the site of use, where the site of use is not a range, for the purposes of storage, reclamation, treatment, disposal or treatment prior to disposal.
- (b) If it is recovered, collected and then disposed of by burial, or landfilling either on or off a range.

(4) For purposes of s. 289.01(33), Stats., a used or fired military munition is a solid waste, and, therefore, is potentially subject to corrective action authorities under ss. 291.37, 291.95 and 291.97, Stats., and subch. S of ch. NR 664, or imminent danger authorities under s. 291.85, Stats., if the munition lands off-range and is not promptly rendered safe or retrieved. Any imminent danger threats associated with any remaining material shall be addressed. If remedial action is infeasible, the operator of the range shall maintain a record of the event for as long as any threat remains. The record shall include the type of munition and its location (to the extent the location is known).

NR 666.203 Standards applicable to the transportation of solid waste military munitions. (1) CRITERIA FOR HAZARDOUS WASTE REGULATION OF WASTE NON-CHEMICAL MILITARY MUNITIONS IN TRANSPORTATION. (a) Waste military munitions that are being transported and that exhibit a hazardous waste characteristic or are listed as hazardous waste under ch. NR 661, are subject to chs. NR 660 to 670, unless all the following conditions are met:

1. The waste military munitions are not chemical agents or chemical munitions.
2. The waste military munitions are transported in accordance with the U.S. department of defense shipping controls applicable to the transport of military munitions.
3. The waste military munitions are transported from a military owned or operated installation to a military owned or operated treatment, storage or disposal facility.
4. The transporter of the waste provides oral notice to the department within 24 hours from the time the transporter becomes aware of any loss or theft of the waste military munitions, or any failure to meet a condition of this paragraph that may endanger health or the environment. In addition, a written submission describing the circumstances shall be provided within 5 days from the time the transporter becomes aware of any loss or theft of the waste military munitions or any failure to meet a condition of this paragraph.

(b) If any waste military munitions shipped under par. (a) are not received by the receiving facility within 45 days of the day the waste was shipped, the owner or operator of the receiving facility shall report this non-receipt to the department within 5 days.

(c) The exemption in par. (a) from regulation as hazardous waste shall apply only to the transportation of non-chemical waste military munitions. It does not affect the regulatory status of waste military munitions as hazardous wastes with regard to storage, treatment or disposal.

(d) The conditional exemption in par. (a) applies only so long as all of the conditions in par. (a) are met.

(2) REINSTATEMENT OF EXEMPTION. If any waste military munition loses its exemption under sub. (1)(a), an application may be filed with the department for reinstatement of the exemption from hazardous waste transportation regulation with respect to the munition as soon as the munition is returned to compliance with the conditions of sub. (1)(a). If the department finds that reinstatement of the exemption is appropriate based on factors such as the transporter's provision of a satisfactory explanation of the circumstances of the violation, or a demonstration that the violations are not likely to recur, the department may reinstate the exemption under sub. (1)(a). If the department does not take action on the reinstatement application within 60 days after receipt of the application, then reinstatement shall be deemed granted, retroactive to the date of the application. However, the department may terminate a conditional exemption reinstated by default in the preceding sentence if the department finds that reinstatement is inappropriate based on factors such as the transporter's failure to provide a satisfactory explanation of the circumstances of the violation, or failure to demonstrate that the violations are not likely to recur. In reinstating the exemption under sub. (1)(a), the department may specify additional conditions as are necessary to ensure and document proper transportation to protect human health and the environment.

(3) AMENDMENTS TO DOD SHIPPING CONTROLS. The U.S. department of defense shipping controls applicable to the transport of military munitions referenced in sub. (1)(a)2. are U.S. government bill of lading (GBL) (U.S. government services administration (GSA) standard form 1103), DOD single line item requisition system document (manual) (DD form 1348), the signature and tally record (DD form 1907), dangerous goods shipping paper/declaration and emergency response information for hazardous materials transported by government vehicles/containers or vessel (DD form 836), and the motor vehicle inspection (transporting hazardous materials) (DD form 626) in effect on November 8, 1995, except as provided in the following sentence. Any amendments to the U.S. department of defense shipping controls shall become effective for purposes of sub. (1)(a) on the date the U.S. department of defense publishes notice in the federal register that the shipping controls referenced in sub. (1)(a)2. have been amended.

Note: GSA standard form 1103 may be obtained by calling federal supply customer assistance at (817) 978-2051, according to information on the Internet at <http://www.gsa.gov>. DD

forms 626, 836, 1348 and 1907 may be obtained at no charge on the Internet at <http://www.dtic.mil/whs/directives/infomgt/forms/formsprogram.htm>

NR 666.204 Standards applicable to emergency responses. Explosives and munitions emergencies involving military munitions or explosives are subject to ss. NR 662.010(9), 663.10(5), 664.0001(7)(h), 665.0001(3)(k) and 670.001(3)(c), or alternatively to s. NR 670.061.

NR 666.205 Standards applicable to the storage of solid waste military munitions. (1) CRITERIA FOR HAZARDOUS WASTE REGULATION OF WASTE NON-CHEMICAL MILITARY MUNITIONS IN STORAGE. (a) Waste military munitions in storage that exhibit a hazardous waste characteristic or are listed as hazardous waste under ch. NR 661, are subject to chs. NR 660 to 679, unless all the following conditions are met:

1. The waste military munitions are not chemical agents or chemical munitions.
2. The waste military munitions are subject to the jurisdiction of the DDESB.
3. The waste military munitions are stored in accordance with the DDESB storage standards applicable to waste military munitions.
4. Within 90 days of the effective date of this section . . . [revisor inserts date] or within 90 days of when a storage unit is first used to store waste military munitions, whichever is later, the owner or operator notifies the department of the location of any waste storage unit used to store waste military munitions for which the conditional exemption in this paragraph is claimed.
5. The owner or operator provides oral notice to the department within 24 hours from the time the owner or operator becomes aware of any loss or theft of the waste military munitions, or any failure to meet a condition of this paragraph that may endanger health or the environment. In addition, a written submission describing the circumstances shall be provided within 5 days from the time the owner or operator becomes aware of any loss or theft of the waste military munitions or any failure to meet a condition of this paragraph.
6. The owner or operator inventories the waste military munitions at least annually, inspects the waste military munitions at least quarterly for compliance with the conditions of this paragraph and maintains records of the findings of these inventories and inspections for at least 3 years.
7. Access to the stored waste military munitions is limited to appropriately trained and authorized personnel.

(b) The conditional exemption in par. (a) from regulation as hazardous waste shall apply only to the storage of non-chemical waste military munitions. It does not affect the regulatory status of waste military munitions as hazardous wastes with regard to transportation, treatment or disposal.

(c) The conditional exemption in par. (a) applies only so long as all of the conditions in par. (a) are met.

(2) NOTICE OF TERMINATION OF WASTE STORAGE. The owner or operator shall notify the department when a storage unit identified in sub. (1)(a)4. will no longer be used to store waste military munitions.

(3) REINSTATEMENT OF CONDITIONAL EXEMPTION. If any waste military munition loses its conditional exemption under sub. (1)(a), an application may be filed with the department for reinstatement of the conditional exemption from hazardous waste storage regulation with respect to the munition as soon as the munition is returned to compliance with the conditions of sub. (1)(a). If the department finds that reinstatement of the conditional exemption is appropriate based on factors such as the owner's or operator's provision of a satisfactory explanation of the circumstances of the violation, or a demonstration that the violations are not likely to recur, the department may reinstate the conditional exemption under sub. (1)(a). If the department does not take action on the reinstatement application within 60 days after receipt of the application, then reinstatement shall be deemed granted, retroactive to the date of the application. However, the department may terminate a conditional exemption reinstated by default in the preceding sentence

if it finds that reinstatement is inappropriate based on factors such as the owner's or operator's failure to provide a satisfactory explanation of the circumstances of the violation, or failure to demonstrate that the violations are not likely to recur. In reinstating the conditional exemption under sub. (1)(a), the department may specify additional conditions as are necessary to ensure and document proper storage to protect human health and the environment.

(4) WASTE CHEMICAL MUNITIONS. (a) Waste military munitions that are chemical agents or chemical munitions and that exhibit a hazardous waste characteristic or are listed as hazardous waste under ch. NR 661, are subject to chs. NR 660 to 670.

(b) Waste military munitions that are chemical agents or chemical munitions and that exhibit a hazardous waste characteristic or are listed as hazardous waste under ch. NR 661, are not subject to the storage prohibition in s. NR 668.50.

(5) AMENDMENTS TO DDESB STORAGE STANDARDS. The DDESB storage standards applicable to waste military munitions, referenced in sub. (1)(a)3., are DOD 6055.9-STD ("DOD Ammunition and Explosives Safety Standards"), incorporated by reference in s. NR 660.11, except as provided in the following sentence. Any amendments to the DDESB storage standards shall become effective for purposes of sub. (1)(a) on the date the U.S. department of defense publishes notice in the federal register that the DDESB standards referenced in sub. (1)(a) have been amended.

NR 666.206 Standards applicable to the treatment and disposal of waste military munitions. The treatment and disposal of hazardous waste military munitions are subject to the applicable permitting, procedural and technical standards in chs. NR 660 to 670.

Chapter NR 666

STANDARDS FOR MANAGING SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subchapter N —Conditional Exemption for Low-Level Mixed Waste Storage, Treatment, Transportation and Disposal

TERMS

NR 666.210 What definitions apply to this subchapter?

STORAGE AND TREATMENT CONDITIONAL EXEMPTION AND ELIGIBILITY

NR 666.220 What does a storage and treatment conditional exemption do?

NR 666.225 What wastes are eligible for the storage and treatment conditional exemption?

NR 666.230 What conditions must you meet for your LLMW to qualify for and maintain a storage and treatment exemption?

TREATMENT

NR 666.235 What waste treatment does the storage and treatment conditional exemption allow?

LOSS OF CONDITIONAL EXEMPTION

NR 666.240 How could you lose the conditional exemption for your LLMW and what action must you take?

NR 666.245 If you lose the storage and treatment conditional exemption for your LLMW, can the exemption be reclaimed?

STORAGE AND TREATMENT RECORDKEEPING

NR 666.250 What storage and treatment records must you keep at your facility and for how long?

REENTRY INTO HAZARDOUS WASTE REGULATION

NR 666.255 When is your LLMW no longer eligible for the storage and treatment conditional exemption?

STORAGE UNIT CLOSURE

NR 666.260 Do closure requirements apply to units that stored LLMW prior to the effective date of this subchapter?

TRANSPORTATION AND DISPOSAL CONDITIONAL EXEMPTION

NR 666.305 What does the transportation and disposal conditional exemption do?

ELIGIBILITY

NR 666.310 What wastes are eligible for the transportation and disposal conditional exemption?

CONDITIONS

NR 666.315 What are the conditions you must meet for your waste to qualify for and maintain the transportation and disposal conditional exemption?

NR 666.320 What treatment standards must your eligible waste meet?

NR 666.325 Are you subject to the manifest and transportation condition in s. NR 666.315(2)?

NR 666.330 When does the transportation and disposal exemption take effect?

NR 666.335 Where must your exempted waste be disposed of?

NR 666.340 What type of container must be used for disposal of exempted waste?

NOTIFICATION

NR 666.345 Whom must you notify?

GENERAL, TRANSPORTATION AND DISPOSAL RECORDKEEPING

NR 666.350 What general, transportation and disposal records must you keep at your facility and for how long?

LOSS OF TRANSPORTATION AND DISPOSAL CONDITIONAL EXEMPTION

NR 666.355 How could you lose the transportation and disposal conditional exemption for your waste and what actions must you take?

NR 666.360 If you lose the transportation and disposal conditional exemption for a waste, can the exemption be reclaimed?

Subchapter N —Conditional Exemption for Low-Level Mixed Waste Storage, Treatment, Transportation and Disposal

TERMS

NR 666.210 What definitions apply to this subchapter? In this subchapter:

(1) “Agreement state” means a state that has entered into an agreement with the NRC under 42 USC 2021(b), to assume responsibility for regulating within its borders byproduct, source or special nuclear material in quantities not sufficient to form a critical mass.

(2) “Certified delivery” means certified mail with return receipt requested, or equivalent courier service, or other means, which provides the sender with a receipt confirming delivery.

(3) “Eligible naturally occurring or accelerator-produced radioactive material” or “eligible NARM” is NARM that is eligible for the transportation and disposal conditional exemption. It is a NARM waste that contains hazardous waste, meets the waste acceptance criteria of, and is allowed by state NARM rules to be disposed of at a low-level radioactive waste disposal facility licensed according to 10 CFR part 61 or NRC agreement state equivalent rules.

(4) “Exempted waste” means a waste that meets the eligibility criteria in s. NR 666.225 and meets all of the conditions in s. NR 666.230, or meets the eligibility criteria in s. NR 666.310 and complies with all of the conditions in s. NR 666.315. That waste is conditionally exempted from the regulatory definition of hazardous waste described in s. NR 661.03.

(5) “Hazardous waste” means any material which is defined to be hazardous waste in accordance with s. NR 661.03.

(6) “Land disposal restriction treatment standards” or “LDR treatment standards” means treatment standards under ch. NR 668, which a hazardous waste must meet before it can be disposed of in a hazardous waste land disposal unit.

(7) “License” means a license issued by the nuclear regulatory commission, or NRC agreement state, to users that manage radionuclides regulated by NRC, or NRC agreement states, under authority of 42 USC 2011 to 2297.

(8) “Low-level mixed waste” or “LLMW” is a waste that contains both low-level radioactive waste and hazardous waste.

(9) “Low-level radioactive waste” or “LLRW” is a radioactive waste which contains source, special nuclear or byproduct material, and which is not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel or byproduct material as defined in 42 USC 2014(e)(2). (See also NRC definition of “waste” at 10 CFR 61.2)

(10) “Mixed waste” means a waste that contains both hazardous waste and source, special nuclear or byproduct material subject to 42 USC 2011 to 2297.

(11) “Naturally occurring or accelerator-produced radioactive material” or “NARM” means radioactive materials that are either of the following:

(a) Naturally occurring and not source, special nuclear or byproduct materials (as defined by 42 USC 2011 to 2297).

(b) Produced by an accelerator. NARM is regulated by the states under state law, or by the U.S. department of energy (DOE) (as authorized by 42 USC 2011 to 2297) under DOE orders.

(12) “NRC” means the U.S. nuclear regulatory commission.

(13) “We or us” within this subchapter, means the department as defined in s. NR 660.10.

(14) “You” means a generator, treater or other handler of low-level mixed waste or eligible NARM.

Note: The U.S. code (USC) cite is also known as the Atomic Energy Act of 1954, as amended.

Note: This subchapter is based on federal regulations contained in 40 CFR part 266 subpart N, revised as of July 1, 2002.

STORAGE AND TREATMENT CONDITIONAL EXEMPTION AND ELIGIBILITY

NR 666.220 What does a storage and treatment conditional exemption do? The storage and treatment conditional exemption exempts your low-level mixed waste from the regulatory

definition of hazardous waste in s. NR 661.03 if your waste meets the eligibility criteria in s. NR 666.225 and you meet the conditions in s. NR 666.230.

NR 666.225 What wastes are eligible for the storage and treatment conditional exemption? Low-level mixed waste (LLMW), defined in s. NR 666.210, is eligible for this conditional exemption if it is generated and managed by you under a single NRC or NRC agreement state license. (Mixed waste generated at a facility with a different license number and shipped to your facility for storage or treatment requires a hazardous waste operating license and is ineligible for this exemption. In addition, NARM waste is ineligible for this exemption.)

NR 666.230 What conditions must you meet for your LLMW to qualify for and maintain a storage and treatment exemption? (1) For your LLMW to qualify for the exemption you shall notify us in writing by certified delivery that you are claiming a conditional exemption for the LLMW stored on your facility. The dated notification shall include your name, address, EPA hazardous waste identification number, NRC or NRC agreement state license number, the hazardous waste codes and storage units for which you are seeking an exemption and a statement that you meet the conditions of this subchapter. Your notification shall be signed by your authorized representative who certifies that the information in the notification is true, accurate and complete. You shall notify us of your claim either within 90 days of the effective date of this rule . . . [revisor inserts date], or within 90 days of when a storage unit is first used to store conditionally exempt LLMW.

(2) To qualify for and maintain an exemption for your LLMW you shall do all of the following:

(a) Store your LLMW waste in tanks or containers in compliance with the requirements of your NRC or NRC agreement state license that apply to the proper storage of low-level radioactive waste (not including those license requirements that relate solely to recordkeeping).

(b) Store your LLMW in tanks or containers in compliance with chemical compatibility requirements of a tank or container in s. NR 664.0177 or 664.0199, or s. NR 665.0177 or 665.0199.

(c) Certify that facility personnel who manage stored conditionally exempt LLMW are trained in a manner that ensures that the conditionally exempt waste is safely managed and includes training in chemical waste management and hazardous materials incidents response that meets the personnel training standards found in s. NR 665.0016(1)(c).

(d) Conduct an inventory of your stored conditionally exempt LLMW at least annually and inspect it at least quarterly for compliance with this subchapter.

(e) Maintain an accurate emergency plan and provide it to all local authorities who may have to respond to a fire, explosion or release of hazardous waste or hazardous constituents. Your plan shall describe emergency response arrangements with local authorities; describe evacuation plans; list the names, addresses and telephone numbers of all facility personnel qualified to work with local authorities as emergency coordinators and list emergency equipment.

TREATMENT

NR 666.235 What waste treatment does the storage and treatment conditional exemption allow? You may treat your low-level mixed waste at your facility within a tank or container in accordance with the terms of your NRC or NRC agreement state license. Treatment that cannot be done in a tank or container without a hazardous waste operating license (such as incineration) is not allowed under this exemption.

LOSS OF CONDITIONAL EXEMPTION

NR 666.240 How could you lose the conditional exemption for your LLMW and what action must you take? (1) Your LLMW will automatically lose the storage and treatment conditional exemption if you fail to meet any of the conditions specified in s. NR 666.230. When your LLMW loses the exemption, you shall immediately manage that waste which failed the condition as hazardous waste, and the storage unit storing the LLMW immediately becomes subject to hazardous waste container or tank storage requirements.

(a) If you fail to meet any of the conditions specified in s. NR 666.230 you shall report to us and the NRC, or the oversight agency in the NRC agreement state, in writing by certified delivery within 30 days of learning of the failure. Your report shall be signed by your authorized representative certifying that the information provided is true, accurate and complete. This report shall include all of the following:

1. The specific conditions you failed to meet.
2. A description of the LLMW (including the waste name, hazardous waste codes and quantity) and storage location at the facility.
3. The dates on which you failed to meet the condition.

(b) If the failure to meet any of the conditions may endanger human health or the environment, you shall also immediately notify us orally within 24 hours and follow up with a written notification within 5 days. Failures that may endanger human health or the environment include, but are not limited to, discharge of a CERCLA reportable quantity or other leaking or exploding tanks or containers, or detection of radionuclides above background or hazardous constituents in the leachate collection system of a storage area. If the failure may endanger human health or the environment, you shall follow the provisions of your emergency plan.

(2) We may terminate your conditional exemption for your LLMW, or require you to meet additional conditions to claim a conditional exemption, for serious or repeated noncompliance with any requirements of this subchapter.

NR 666.245 If you lose the storage and treatment conditional exemption for your LLMW, can the exemption be reclaimed? (1) You may reclaim the storage and treatment exemption for your LLMW if you do all of the following:

(a) Again meet the conditions specified in s. NR 666.230.

(b) Send us a notice by certified delivery that you are reclaiming the exemption for your LLMW. Your notice shall be signed by your authorized representative certifying that the information contained in your notice is true, complete and accurate. In your notice you shall do all of the following:

1. Explain the circumstances of each failure.
2. Certify that you have corrected each failure that caused you to lose the exemption for your LLMW and that you again meet all the conditions as of the date you specify.
3. Describe plans that you have implemented, listing specific steps you have taken, to ensure the conditions will be met in the future.
4. Include any other information you want us to consider when we review your notice reclaiming the exemption.

(2) We may terminate a reclaimed conditional exemption if we find that your claim is inappropriate based on factors including, but not limited to, your failure to correct the problem, to provide a satisfactory explanation of the circumstances of the failure or to implement a plan with steps to prevent another failure to meet the conditions of s. NR 666.230. In reviewing a reclaimed conditional exemption under this section, we may add conditions to the exemption to ensure that waste management during storage and treatment of the LLMW will protect human health and the environment.

NR 666.250 What storage and treatment records must you keep at your facility and for how long? (1) In addition to those records required by your NRC or NRC agreement state license, you shall keep all of the following records:

- (a) Your initial notification records, return receipts, reports to us of failures to meet the exemption conditions and all records supporting any reclaim of an exemption.
 - (b) Records of your LLMW annual inventories, and quarterly inspections.
 - (c) Your certification that facility personnel who manage stored mixed waste are trained in safe management of LLMW including training in chemical waste management and hazardous materials incidents response.
 - (d) Your emergency plan as specified in s. NR 666.230(2).
- (2)** You shall maintain records concerning notification, personnel trained and your emergency plan for as long as you claim this exemption and for 3 years thereafter, or according to NRC regulations under 10 CFR part 20 (or equivalent NRC agreement state rules), whichever is longer. You shall maintain records concerning your annual inventory and quarterly inspections for 3 years after the waste is sent for disposal, or according to NRC regulations under 10 CFR part 20 (or equivalent NRC agreement state rules), whichever is longer.

REENTRY INTO HAZARDOUS WASTE REGULATION

NR 666.255 When is your LLMW no longer eligible for the storage and treatment conditional exemption? (1) When your LLMW has met the requirements of your NRC or NRC agreement state license for decay-in-storage and can be disposed of as non-radioactive waste, then the conditional exemption for storage no longer applies. On that date your waste is subject to hazardous waste regulation under the relevant sections of chs. NR 660 to 670, and the time period for accumulation of a hazardous waste as specified in s. NR 662.34 begins.

(2) When your conditionally exempt LLMW, which has been generated and stored under a single NRC or NRC agreement state license number, is removed from storage, it is no longer eligible for the storage and treatment exemption. However, your waste may be eligible for the transportation and disposal conditional exemption at s. NR 666.305.

STORAGE UNIT CLOSURE

NR 666.260 Do closure requirements apply to units that stored LLMW prior to the effective date of this subchapter? Interim licensed and operating licensed hazardous waste storage units that have been used to store only LLMW prior to the effective date of this subchapter . . . [revisor inserts date] and, after that date, store only LLMW which becomes exempt under this subchapter, are not subject to the closure requirements of chs. NR 664 and 665. Storage units (or portions of units) that have been used to store both LLMW and non-mixed hazardous waste prior to the effective date of this subchapter . . . [revisor inserts date] or are used to store both after that date remain subject to closure requirements with respect to the non-mixed hazardous waste.

TRANSPORTATION AND DISPOSAL CONDITIONAL EXEMPTION

NR 666.305 What does the transportation and disposal conditional exemption do? This conditional exemption exempts your waste from the regulatory definition of hazardous waste in s. NR 661.03 if your waste meets the eligibility criteria under s. NR 666.310, and you meet the conditions in s. NR 666.315.

ELIGIBILITY

NR 666.310 What wastes are eligible for the transportation and disposal conditional exemption? Eligible waste shall be either of the following:

- (1) A low-level mixed waste (LLMW), as defined in s. NR 666.210, that meets the waste acceptance criteria of a LLRW disposal facility.
- (2) An eligible NARM waste, defined in s. NR 666.210.

CONDITIONS

NR 666.315 What are the conditions you must meet for your waste to qualify for and maintain the transportation and disposal conditional exemption? You shall meet all of the following conditions for your eligible waste to qualify for and maintain the exemption:

- (1) The eligible waste shall meet or be treated to meet LDR treatment standards as described in s. NR 666.320.
- (2) If you are not already subject to NRC, or NRC agreement state equivalent manifest and transportation rules for the shipment of your waste, you shall manifest and transport your waste according to NRC regulations as described in s. NR 666.325.
- (3) The exempted waste shall be in containers when it is disposed of in the LLRW disposal facility as described in s. NR 666.340.
- (4) The exempted waste shall be disposed of at a designated LLRW disposal facility as described in s. NR 666.335.

NR 666.320 What treatment standards must your eligible waste meet? Your LLMW or eligible NARM waste shall meet the land disposal restriction (LDR) treatment standards specified in subch. D of ch. NR 668.

NR 666.325 Are you subject to the manifest and transportation condition in s. NR 666.315(2)? If you are not already subject to NRC, or NRC agreement state equivalent manifest and transportation rules for the shipment of your waste, you shall meet the manifest requirements under 10 CFR 20.2006 (or NRC agreement state equivalent rules), and the transportation requirements under 10 CFR 1.5 (or NRC agreement state equivalent rules) to ship the exempted waste.

NR 666.330 When does the transportation and disposal exemption take effect? The exemption becomes effective once all the following have occurred:

- (1) Your eligible waste meets the applicable LDR treatment standards.
- (2) You have received return receipts that you have notified us and the LLRW disposal facility as described in s. NR 666.345.
- (3) You have completed the packaging and preparation for shipment requirements for your waste according to NRC packaging and transportation regulations found under 10 CFR part 71 (or NRC agreement state equivalent rules); and you have prepared a manifest for your waste according to NRC manifest regulations found under 10 CFR part 20 (or NRC agreement state equivalent rules).
- (4) You have placed your waste on a transportation vehicle destined for a LLRW disposal facility licensed by NRC or an NRC agreement state.

NR 666.335 Where must your exempted waste be disposed of? Your exempted waste shall be disposed of in a LLRW disposal facility that is regulated and licensed by NRC under 10 CFR part 61 or by an NRC agreement state under equivalent state rules, including state NARM licensing rules for eligible NARM.

NR 666.340 What type of container must be used for disposal of exempted waste? Your exempted waste shall be placed in containers before it is disposed. The container shall be any of the following:

- (1) A carbon steel drum.
- (2) An alternative container with equivalent containment performance in the disposal environment as a carbon steel drum.
- (3) A high integrity container as defined by NRC.

NOTIFICATION

NR 666.345 Whom must you notify? (1) You shall provide a one-time notice to us stating that you are claiming the transportation and disposal conditional exemption prior to the initial shipment of an exempted waste from your facility to a LLRW disposal facility. Your dated written notice shall include your facility name, address, phone number and EPA ID number, and be sent by certified delivery.

(2) You shall notify the LLRW disposal facility receiving your exempted waste by certified delivery before shipment of each exempted waste. You may only ship the exempted waste after you have received the return receipt of your notice to the LLRW disposal facility. This notification shall include all of the following:

- (a) A statement that you have claimed the exemption for the waste.
- (b) A statement that the eligible waste meets applicable LDR treatment standards.
- (c) Your facility's name, address and EPA hazardous waste ID number.
- (d) The hazardous waste codes prior to the exemption of the waste streams.
- (e) A statement that the exempted waste shall be placed in a container according to s. NR 666.340 prior to disposal in order for the waste to remain exempt under the transportation and disposal conditional exemption of this subchapter.
- (f) The manifest number of the shipment that will contain the exempted waste.
- (g) A certification that all the information provided is true, complete and accurate. Your authorized representative shall sign the statement.

GENERAL, TRANSPORTATION AND DISPOSAL RECORDKEEPING

NR 666.350 What general, transportation and disposal records must you keep at your facility and for how long? In addition to those records required by your NRC or NRC agreement state license, you shall keep records according to all of the following:

- (1) You shall follow the applicable existing recordkeeping requirements under ss. NR 664.0073, 665.0073 and 668.07 to demonstrate that your waste has met LDR treatment standards prior to your claiming the exemption.
- (2) You shall keep a copy of all notifications and return receipts required under ss. NR 666.355 and 666.360 for 3 years after the exempted waste is sent for disposal.
- (3) You shall keep a copy of all notifications and return receipts required under s. NR 666.345(1) for 3 years after the last exempted waste is sent for disposal.
- (4) You shall keep a copy of the notification and return receipt required under s. NR 666.345(2) for 3 years after the exempted waste is sent for disposal.
- (5) If you are not already subject to NRC, or NRC agreement state equivalent manifest and transportation rules for the shipment of your waste, you shall also keep all other documents related to tracking the exempted waste as required under 10 CFR 20.2006 or NRC agreement state equivalent rules, including applicable NARM requirements, in addition to the records specified in subs. (1) to (4).

LOSS OF TRANSPORTATION AND DISPOSAL CONDITIONAL EXEMPTION

NR 666.355 How could you lose the transportation and disposal conditional exemption for your waste and what actions must you take? (1) Any waste will automatically lose the transportation and disposal exemption if you fail to manage it in accordance with all of the conditions specified in s. NR 666.315.

(a) When you fail to meet any of the conditions specified in s. NR 666.315 for any of your wastes, you shall report to us, in writing by certified delivery, within 30 days of learning of the failure. Your report shall be signed by your authorized representative certifying that the information provided is true, accurate and complete. This report shall include all of the following:

1. The specific conditions that you failed to meet for the waste.
2. A description of the waste (including the waste name, hazardous waste codes and quantity) that lost the exemption.

3. The dates on which you failed to meet the conditions for the waste.

(b) If the failure to meet any of the conditions may endanger human health or the environment, you shall also immediately notify us orally within 24 hours and follow up with a written notification within 5 days.

(2) We may terminate your ability to claim a conditional exemption for your waste, or require you to meet additional conditions to claim a conditional exemption, for serious or repeated noncompliance with any requirements of this subchapter.

NR 666.360 If you lose the transportation and disposal conditional exemption for a waste, can the exemption be reclaimed? (1) You may reclaim the transportation and disposal exemption for a waste after you have received a return receipt confirming that we have received your notification of the loss of the exemption specified in s. NR 666.355(1) if both of the following apply:

(a) You again meet the conditions specified in s. NR 666.315 for the waste.

(b) You send a notice, by certified delivery, to us that you are reclaiming the exemption for the waste. Your notice shall be signed by your authorized representative certifying that the information provided is true, accurate and complete. The notice shall do all of the following:

1. Explain the circumstances of each failure.
2. Certify that each failure that caused you to lose the exemption for the waste has been corrected and that you again meet all conditions for the waste as of the date you specify.
3. Describe plans you have implemented, listing the specific steps that you have taken, to ensure that conditions will be met in the future.
4. Include any other information you want us to consider when we review your notice reclaiming the exemption.

(2) We may terminate a reclaimed conditional exemption if we find that your claim is inappropriate based on factors including, but not limited to, your failure to correct the problem, to provide a satisfactory explanation of the circumstances of the failure or to implement a plan with steps to prevent another failure to meet the conditions of s. NR 666.315. In reviewing a reclaimed conditional exemption under this section, we may add conditions to the exemption to ensure that transportation and disposal activities will protect human health and the environment.

Chapter NR 666

STANDARDS FOR MANAGING SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subchapter HH —Household and Very Small Quantity Generator Hazardous Waste Collection Facilities

NR 666.900	Applicability.
NR 666.901	Definitions.
NR 666.902	Standards for design of permanent collection facilities.
NR 666.903	Standards for operation of permanent collection facilities.
NR 666.904	Standards for operation of temporary collection facilities.
NR 666.905	Transportation requirements.
NR 666.909	Closure requirements.
NR 666.910	Financial responsibility requirements for permanent collection facilities.

NR 666.900 Applicability. This subchapter establishes minimum design and operating standards for owners or operators of collection facilities that collect or accumulate household hazardous waste or very small quantity generator waste, or both. The owner or operator of a collection facility is exempt from the hazardous waste storage facility standards and licensing requirements in chs. NR 664, 665 and 670 if the owner or operator complies with this subchapter.

NR 666.901 Definitions. In addition to the definitions in s. NR 660.10, the following definitions apply to this subchapter:

- (1) “Affected municipality” means a town, city, village or county in which a collection facility is located, or is proposed to be located.
- (2) “Collection facility” means a facility established to collect or accumulate household hazardous waste or very small quantity generator waste, or both.
- (3) “Household hazardous waste” means a household waste that exhibits a characteristic of hazardous waste or is listed in ch. NR 661.
- (4) “Permanent collection facility” means a collection facility where household hazardous waste or very small quantity generator waste, or both, is collected or accumulated for more than 5 consecutive days.
- (5) “Temporary collection facility” means a collection facility where household hazardous waste or very small quantity generator waste, or both, is collected or accumulated for no more than 5 consecutive days.

NR 666.902 Standards for design of permanent collection facilities. The owner or operator of a permanent collection facility shall construct and maintain the facility according to all of the following minimum design criteria:

- (1) A collection facility may not be located in any of the following:
 - (a) A flood plain.
 - (b) A wetland.
 - (c) A habitat determined by the department to be critical to the continued existence of an endangered species listed in ch. NR 27.
- (2) The maximum volume of hazardous waste stored may not exceed 240,000 pounds (109,091 kg).
- (3) All waste shall be accumulated in containers in a building completely enclosed with a floor, walls and roof to prevent exposure to the elements.
- (4) The floor underlying the containers shall be free of cracks and gaps and sufficiently impervious to contain leaks and spills until the released material is detected and removed.
- (5) The floor shall be sloped or a containment system shall be designed and operated to drain and remove liquids resulting from leaks or spills, unless the containers are elevated or are otherwise prevented from contact with accumulated liquids.

(6) The containment system shall have sufficient capacity to contain the volume of the largest container, or 10% of the volume of all containers, whichever is greater. Containers that do not contain free liquids need not be considered in this determination.

(7) Spilled or leaked waste shall be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system.

NR 666.903 Standards for operation of permanent collection facilities. An owner or operator of a permanent collection facility shall comply with all of the following:

(1) At least 30 days prior to first accepting hazardous waste from off-site, submit the "Notification of Activity for Household and Very Small Quantity Generator Hazardous Waste Collection Facility" form 4430-020 to the department and to the clerk of the affected municipalities.

Note: Form 4430-020 may be obtained from:
Wisconsin Department of Natural Resources
Bureau of Waste Mgmt - WA/3
101 S. Webster St.
P.O. Box 7921
Madison, WI 53707-7921
Phone (608)266-2111
Fax (608) 267-2768

(2) The notification requirements in s. NR 660.07.

(3) The land disposal restrictions storage prohibition standards in s. NR 668.50(2) and (3).

(4) The container marking standards in s. NR 668.50(1)(b)1.

(5) The container standards in ss. NR 665.0170 to 665.0178.

(6) The general requirements for ignitable, reactive or incompatible waste in s. NR 665.0017.

(7) The security requirements in s. NR 665.0014.

(8) The inspection requirements in s. NR 665.0015.

(9) The preparedness and prevention requirements in ss. NR 665.0030 to 665.0037.

(10) The contingency plan and emergency procedure requirements in ss. NR 665.0050 to 665.0056.

(11) The personnel training requirements in s. NR 665.0016.

(12) The recordkeeping and reporting requirements in s. NR 662.040(2) to (4) and ss. NR 662.041 to 662.043.

(13) If waste is accepted from very small quantity generators, provide a hazardous waste shipment receipt to the very small quantity generator. The shipment receipt shall include the information specified in pars. (a) to (c), and copies of the receipts shall be retained according to par. (d).

(a) The generator's company name and location, including street address, city and state.

(b) The quantity and type of waste.

(c) The date the waste was accepted by the collection facility.

(d) Retain a copy of the shipment receipt for a minimum of 3 years from the date the shipment was received.

(14) If waste is bulked, prevent the mixing of incompatible wastes by testing or applying knowledge of the waste. If testing is performed, retain records of the test results for a minimum of 3 years from the date of analysis.

(15) If hazardous waste is treated, it shall be done only as follows:

(a) Neutralized in an elementary neutralization unit, as defined in s. NR 660.10.

(b) By the addition of absorbent materials to wastes, according to s. NR 665.0001(3)(m).

NR 666.904 Standards for operation of temporary collection facilities. An owner or operator of a temporary collection facility shall comply with all of the following:

(1) At least 30 days prior to first accepting hazardous waste from off-site, submit the “Notification of Activity for Household and Very Small Quantity Generator Hazardous Waste Collection Facility” form 4430-020 to the department and to the clerk of the affected municipalities.

Note: Form 4430-020 may be obtained from:
Wisconsin Department of Natural Resources
Bureau of Waste Mgmt - WA/3
101 S. Webster St.
P.O. Box 7921
Madison, WI 53707-7921

Phone (608)266-2111
Fax (608) 267-2768

(2) Operate in a manner to prevent releases of hazardous waste constituents to the environment.

(3) The container standards in ss. NR 665.0170 to 665.0178 except 665.0174.

(4) The container marking standards in s. NR 668.50(1)(b)1.

(5) The general requirements for ignitable, reactive or incompatible waste in s. NR 665.0017.

(6) The emergency procedures and personnel training requirements in s. NR 662.192(1)(e).

(7) If waste is accepted from very small quantity generators, provide a hazardous waste shipment receipt to the very small quantity generator. The shipment receipt shall include the information specified in pars. (a) to (c), and copies of the receipts shall be retained according to par. (d).

(a) The generator’s company name and location, including street address, city and state.

(b) The quantity and type of waste.

(c) The date the waste was accepted by the collection facility.

(d) Retain a copy of shipment receipts for a minimum of 3 years from the date the shipment was received.

(8) If waste is bulked, prevent the mixing of incompatible wastes by testing or applying knowledge of the waste. If testing is performed, retain records of the test results for a minimum of 3 years from the date of analysis.

(9) If hazardous waste is treated, it shall be done only as follows:

(a) Neutralized in elementary neutralization units, as defined in s. NR 660.10.

(b) By the addition of absorbent materials to wastes, according to s. NR 665.0001(3)(m).

NR 666.905 Transportation requirements. (1) An owner or operator of a collection facility who offers hazardous waste for transport for off-site treatment, storage or disposal shall comply with all of the following:

(a) The pre-transportation requirements in ss. NR 662.030 to 662.033.

(b) The manifest requirements in ss. NR 662.020 to NR 662.023.

(c) The manifest retention requirements in ss. NR 662.040(1) and (4).

(d) The land disposal restriction requirements in s. NR 668.07(1).

(2) An owner or operator of a collection facility who transports hazardous waste off-site for treatment, storage or disposal shall comply with sub. (1), and ch. NR 663.

(3) An owner or operator of a collection facility may transport hazardous waste, or offer hazardous waste for transport, to a permanent collection facility without using a hazardous waste

manifest or obtaining a transportation license for the purpose of bulking or consolidating waste, if the owner or operator complies with all of the following:

- (a) The pre-transportation requirements in ss. NR 662.030 to 662.033.
- (b) Provide written notification of the waste properties and applicable land disposal restrictions standards to the receiving facility prior to shipment of the waste.

NR 666.909 Closure requirements. (1) Within 5 days of initially accepting waste, an owner or operator of a temporary collection facility shall close the facility according to all of the following:

- (a) Ensure delivery of all waste to an off-site hazardous waste treatment, storage or disposal facility, or a permanent collection facility.
- (b) Close the collection facility in a manner that meets all of the following:
 - 1. Minimizes the need for further maintenance.
 - 2. Controls, minimizes or eliminates the escape of hazardous waste, hazardous constituents or contaminated run-off to the ground, surface waters or the atmosphere.

(2) An owner or operator of a permanent collection facility that closes for the season shall close the facility according to all of the following:

- (a) Ensure delivery of all waste to an off-site hazardous waste treatment, storage or disposal facility, or another permanent collection facility, within 90 days of the last day of accepting waste.
- (b) Close the collection facility in a manner that meets all of the following:
 - 1. Minimizes the need for further maintenance.
 - 2. Controls, minimizes or eliminates the escape of hazardous waste, hazardous constituents or contaminated run-off to the ground, surface waters or the atmosphere.

(c) Comply with the closure standards in s. NR 665.0114.

(3) An owner or operator of a permanent collection facility that closes permanently shall close the facility according to all of the following:

- (a) Sub. (2)(a) to (c).
- (b) Within 60 days of completion of closure, submit a report to the department summarizing the activities performed to meet the requirements in par. (a).

NR 666.910 Financial responsibility requirements for permanent collection facilities. (1) The owner or operator of a permanent collection facility that stores more than 80,000 pounds (36,364 kg) at any time shall meet all of the following closure cost estimate requirements prior to accepting waste:

- (a) Obtain a detailed written estimate, in current dollars, of the cost of final closure of the collection facility according to s. NR 666.909(2)(a) to (c).
- (b) Calculate the closure cost estimate using the cost of hiring a third party to remove and properly manage the estimated maximum inventory of waste.
- (c) Submit the detailed closure cost estimate with the notification form required in s. NR 666.903(1).
- (d) Submit an updated closure cost estimate adjusted annually for inflation to the department as required in s. NR 665.0142(2).
- (e) Adjust the closure cost estimate as necessary according to the requirements in s. NR 665.0142(3).

(2) The owner or operator of a permanent collection facility that stores more than 80,000 pounds (34,364 kg) at any time shall meet all of the following financial assurance requirements prior to accepting waste:

- (a) Establish financial assurance for closure of the collection facility, as required in s. NR 665.0143.

(b) Submit proof of financial assurance to the department with the notification form required in s. NR 666.903(1).

(3) Within 60 days of receipt of the summary report required by s. NR 666.909(3)(b), the department shall notify the owner or operator of one of the following:

(a) Closure is complete and the owner or operator may apply to the department for a release of the proof of financial responsibility.

(b) Additional closure activities are necessary to comply with s. NR 666.909(2) and proof of financial responsibility shall be maintained.